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To Professor Leslie.
with the Compliments
of

PENNSYLVANIA HOSPITAL

Addinell Hewson

Phila. Sept 9. 1876

# REPORTS.

VOL. I.—1868.

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# PREFACE.

THE publication of a volume like the present was projected some time since, but owing to the disturbed state of the country the design was not carried into effect. It seems, however, as if it could be done so now with advantage; and it is contemplated to issue every year a similar collection of Hospital Reports.

Each volume will be complete in itself, and will be made up of papers of practical interest, and of clinical lectures by the Medical and Surgical staff of the Hospital. But they will not be the only contributors, for its pages are open to the physicians and surgeons—many of eminence now in the land—who have, as residents or otherwise, been connected with the Institution, have imbued its opinions, and received their training while serving it.

The Pennsylvania Hospital, with its well-arranged wards, containing beds for two hundred and twenty-five patients, selected constantly from a very large number of applicants, must certainly always possess much material of value. The publication of Hospital Reports is a sure means of making available, as well as a strong incentive for producing, this otherwise hidden treasure; which benefits thus not only the few who have had ready access to it, but the many to whom such access is impossible. In work of this kind it seems

fitting that the oldest Hospital in the country should be the first to send forth, under its own seal, the experiences gained within its walls.

The arrangement of the matter for these volumes has devolved upon two of us; but for the opinions expressed, as well as for the mode of their expression, each author is alone responsible.

J. M. Da Costa,
William Hunt,
On behalf of the Medical and Surgical staff.

Philadelphia,
January 1st, 1868.

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# THE PENNSYLVANIA HOSPITAL:

AND

## REMINISCENCES OF THE PHYSICIANS AND SURGEONS WHO HAVE SERVED IT.

By CHARLES D. MEIGS, M.D.,

FORMERLY ONE OF THE PHYSICIANS TO THE LYING-IN DEPARTMENT OF THE PENNSYLVANIA HOSPITAL; EMERITUS PROFESSOR OF MIDWIFERY IN THE JEFFERSON MEDICAL COLLEGE, ETC.

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Pennsylvania Hospital Reports!!—At last! and that only upon attaining to the ripe age of one hundred and twelve years!

The house was founded in Anno Domini 1755, and its foundation corner-stone was laid by the honorable hands of Franklin, with prayers and blessings.

There are many American physicians now bent under a weight of years; many in the prime of life, and many in the full career of their usefulness and honor; many that are yet young but aspiring, who will joyfully hail this evidence of the continued existence and augmented vital force of the venerable house where they used to congregate to participate in the riches of her wisdom, her steady habits, her probity, and in the prestige of her ancient renown. Hardly could a more acceptable offering be laid upon the altar of medical science in America than a faithful, dispassionate statement of the experiences of that noble foundation,—and it assuredly rests alone with the medical staff of the house to raise up

this work to the high rank of a rich American contribution to Medicine and Surgery and Therapeutics, as one of the very safest and most useful among the innumerable offerings at our shrine, that come in, as it were, like a flood, from all parts of the civilized and scientific world.

A hospital, like a man, must have its infancy, its childhood, its puberty, and its mature age. Such a progress is, in fact, its education, and that education can never be the work of a single day: it was Minerva, alone, that sprung full-armed and panoplied out of the head of Jove. But our education has been going on for one hundred and twelve years, and it is easy to see that we have tarried awhile at Jericho, and have lingered there, until our beards were full-grown, ere we assumed to present ourselves to the public as true Israelites—true as *turquoise de la vieille roche.*

An education, carried steadily onward for more than a whole century (near one-eighteenth part of Christianism), and conducted very nearly during the whole process upon one line of formulas, might, with reason, be supposed long enough to establish a sort of specific character. We think that our foundation has so acquired a peculiar character, by which it may be known and discriminated from among the mass of its likes and contemporaries in the general community of hospitals.

In a medical and surgical hospital, newly established, there must of necessity arise, at first, no little uncertainty and hesitation, which will continue until it shall have taken on a sort of idiosyncrasy of manners and customs, by which it will be individualized and become known and distinguished from others, whether new or old. In a long progress, the manners and customs, the usages and processes, and the very æsthetics of a hospital become settled, and at last unchanging; so that, in time, one institution is individualized and seen to be different from another, as one person, or one nation differs from another person or another nation in feature, in language, and in manners and customs. It is easy to say of men: This one is a Spaniard; there's an Italian, an Englishman, or a Frenchman; and, in like manner, one might

say: There is Guy's; yonder is Hotel Dieu, and there is the Massachusetts General Hospital; but this is the honorable and ancient Pennsylvania Hospital. She it is that speaks to us, and not another. Let us hearken to her voice. What has she to say unto us? Does not her very age and stability give us some assurance of hope that we may rely upon her words in this new phase of her old life, as a reliable, and a rich fountain of instruction?

Do we merely flatter ourselves, then, when we indulge the belief, that in the United States, our venerable institution, so widely known and so long and highly respected, will be looked to with much trustfulness, when coming forth, as now, from her centurial silence, she assumes to speak as *ex cathedra*, and claim a higher place in our American schools of medicine and surgery? We cannot but opine that in thus concluding to make more public her inner life and charities by the circulation of regular reports of her clinical experiences and observations, and methods of teaching, she must become an accepted clinical teacher, not for Philadelphia alone, but for universal Medicine; and that, if the managers of this enterprise should, in time, come to send forth sincere reports of her clinical lectures and clinical transactions, they cannot but attain an authority equal to those of the most distinguished hospitals of the world. Hence, we may expect that these volumes will meet with a most hearty and general welcome by all the lovers of progress in our calling, at home and abroad; such a welcome will be the warmer from the fact that vast numbers of our American physicians have been students of the house, and after "walking her wards," have carried out into the remotest regions of the Great Republic, a lively memory of the pleasant and profitable hours spent within her walls; memories of the scientific truths; memories of the fine diagnoses, the sure prognoses, and the skilful applications of therapeutics and surgery, whose accuracy surprised, while the boldness and dexterity astonished them. Not hundreds, but thousands of these American physicians, have carried out and spread everywhere in the land the testimonies and traditions that

have made her name familiar as a household word: we heard that household word in our remote village near a thousand miles away, and near three-quarters of a century ago. Though she never before thought to make herself thus an open and public dispenser of knowledge, out of, and far from her own boundary walls, yet how many thousands of them that were in weakness and pain, and in the fear of imminent death have, for a century past, owed their relief and their release to her far-reaching, modest, and silent charity.

We trust it is by no means presumptuous to claim for this ancient and honored institution an undoubted precedence in the possession of the most eminent among American physicians and surgeons; since barely to mention the names of Dr. Rush and Dr. Philip Syng Physick ought to establish that claim, for those names are *facile facilime principes* in American physic and surgery.

To these may rightly be added the venerated names of Kuhn, Barton, Wistar, Dorsey, I. Rhea Barton, and James. These alone appear to us to warrant our assumption of a former superiority in American medical teachings, while we, by no means, are so impertinent as to claim a present supereminence, where the immense progress of American civilization has scattered broadcast over the land the richest, the most precious treasures of science and art in our noble profession: but it will not be deemed an impudence, on our part, to pretend to at least equal rank in the actual republic of medical letters.

For our private opinion we beg to excuse ourselves, on the ground that, very early in the century, we had the happiness, and the great happiness, to sit at the feet of many of those Gamaliels who so overbore our young hearts and minds with an intimate conviction of their virtue and wisdom that even the chill of old age is as yet impotent to lessen the glow of our admiration and gratitude to such excellent, such learned and wise masters. We but fulfil the engagement made for us more than twenty centuries ago in the famous and still living Iusjurandum of the Father of Medicine in

honoring from our earliest date of life, masters who graciously taught us to heal sick men and women.

We esteem the greatest name of the men who in that now somewhat distant day served in the Pennsylvania Hospital, was the name of Dr. Benjamin Rush, Professor of the Practice of Medicine in the University of Pennsylvania.

That eminent physician's renown was not founded alone upon his grand career in the fatal epidemic of 1793, or in like occurrences in years following. It depended far more upon his surpassing and most captivating eloquence, upon his great wisdom, his learning, and the inextinguishable zeal whose fire was not in the least assuaged at the time we attended upon his last course of lectures, at that venerable and beautiful old age, which soon afterwards let him gently down into an honored grave where his remains now rest, more sacred than the dust that draws thousands of annual pilgrims to the tomb of the Imaums.

May we not stop a moment just here, to express the wish and the hope, that ere many years shall have elapsed, the statue of that eminent American may find its appropriate plinth in some conspicuous part of the town whose very name is signally honored by his whole life and conversation. May all Philadelphia cry out with one voice *Placet, placet!*

Dr. Rush, by his actions and his writings became in a certain sense and extent the American Galen, for we think it cannot be doubted that he did transmit his idea, as a governing and directing element down through more than half a century of American Medicine, controlling the practice of physic with an authority during that time, as potent as was the authority of the great Pergamenian in the far longer series of centuries, from the second until deep into the seventeenth. Yet even to-day the name of Galen is not blotted out; and like Rush's is only under the eclipse of this progressive age. They are both marking and ineffaceable titles on the roll of history in our Medicine. In a great degree, Dr. Rush, though so long ago joined to his fathers, still rules much of the medical practice in many parts of the

United States. His was a great mission and he filled his station well.

When I was a boy of 12 years old, the name of Dr. Rush was a sort of myth in my young ears, and was known by all the people of yon sequestered village on the Creek Frontier; and when in the autumn of 1812, I first entered his lecture-room in the old University building on Ninth Street, I was enrapt: his voice, sweeter than any flute, fell on my ears like droppings from a Sanctuary, and the spectacle of his beautiful radiant countenance, with his earnest, most sincere, most persuasive accents, sunk so deep into my heart that neither time nor change could eradicate them from where they are at this hour freshly remembered. Oh! but he was a most charming gentleman! a "grave and reverend and potent signor" in the scholar class of mankind!

Now this was one of the men who graced this old Hospital in our young days, with his teachings, his learning, his wisdom and his manners, formed upon the grand old style of Washington's court, of which, alas! but a few scattered and bowed down specimens are here and there to be seen lingering in our country.

There it was, as well as in his lecture-room, that he helped to mould and fashion the manners and deportment of that house in a way to make it specific—characteristical. Yet not to him alone are our thanks due for the form of this school and its individual significancy. He had brave coadjutors whose ministrations there and elsewhere laid on the brows of Philadelphia the Science-Crown, that shone so far and so bright in those palmy days of his School of Medicine.

Dr. Kuhn, a favorite pupil of Linnæus, who learned to love him at Upsala, was a man distinguished for learning and probity; an honor to our calling. Dr. Philip Syng Physick, long a pupil and assistant and trusted friend of Mr. Hunter, and long a resident in the Hospital in Mr. Hunter's service at London, was like his master a model of exactness and certainty. I never saw a man who knew so thoroughly well all that he knew. It seemed as if his science and art were ledgered in his brain, so that he could turn on the in-

stant to page and line. Dr. Physick's service in the house was continued during more than twenty-two years, from 1794 to 1816, when he resigned his office. His manners were to the last degree dignified and elegant, and as he still wore his hair powdered and clubbed, he bore about him a sort of traditional look, which added to the respect which everywhere, in public and private greeted him, always reverently. In the midst of a crowd of students more than five hundred in number assembled from all quarters of the compass, impetuous, ingenuous hot heads from the Carolinas, restless Georgians, bold sons of Kentucky, and buckeyes from the Northwest, or the graver students from the North, the moment the Professor entered the lecture-room, all was hush, with a general pleased expression murmured all over the amphitheatre, "and ear and eye attentive bent" to the mellifluous tones of his voice, or the most admirable illustrations of surgical processes that he so profusely supplied. He was a man like a statue of marble but animated by a promethean light and warmth. Dr. Physick was a very marking man in our American world of Medicine, a man altogether peculiar for ability and therefore most rare and most highly to be prized; he too was one of the men who stamped so deeply into the old Hospital the legend on its name-shield "conservatism." The same motives that lead us to remember Dr. Rush and Professor Physick, prompt us to refer to the learned, benign, beloved Wistar; Caspar Wistar, long the able Professor of Anatomy in the University of Pennsylvania, where and from his honorable See, he dispensed over the land the precious doctrines, upon which are based all our hopes of usefulness and distinction in the profession of physic. He was fully up to the broad level of the time, and he too carried there his grave, serene, most admirable manners as examples of the polite demeanor of gentlemen at the close of the 18th century. No student dared to behave unlike a gentleman in his presence. How could such men serve and act and command so long in that house, and not leave like a beautiful ship in the sea, a long bright wake of gentle light behind! Here too was Dorsey, John Syng Dorsey, a nephew of Dr.

Physick, adjunct first, and next full Professor of Surgery, brought up in his likeness, an eloquent, ardent, most able teacher, a gentleman most popular in the Hospital and the school alike, but too soon alas, snatched from us by the same fatal power that early deprived the world of the admirable Bichat.

Whoever will read Dorsey's Surgery will learn what it was that common sense said in those times in the art of surgery. Though we have not the least doubt or lack of faith in the great progress of medicine in all its branches in the 19th century, must we first say *risum teneatis amici* before we venture to add that we early received Dorsey's Surgery as a man takes his wife, for better, for worse, in sickness and in health, until death doth us part; and though our golden wedding is already past and gone, that we adhere to our engagement then and there.

That eminent gentleman, Dr. Thomas T. Hewson, with whom it was our privilege to enjoy a long and friendly acquaintance, was one of the good furtherers of our house's name and fame. Dr. Joseph Hartshorne, a bold, highly instructed, and most dexterous surgeon; Joseph Parrish, a model man, from the Society of Friends; Dr. I. Rhea Barton, for thirteen years and five months the ornament and pride of the surgical department of the Hospital, in which his mind had been trained by his very long residence as house pupil, in a department he illustrated by his rare conservatism and acknowledged skill: these and many others whom we love to remember, but yet are too redundant for this our limited space, but among them a man born for the place, and in his own, his right place,—we mean Dr. William Pepper. How can we omit the name of Dr. William Pepper? To name him is to praise him, so extensively known as the admirable clinical lecturer at the Hospital for near twenty consecutive years, and subsequently as Professor of the Practice of Medicine in the University of Pennsylvania.

Well, then, a child grows up to manhood, forming and forming, and forming his character from day to day, as a

slender shoot from the buried acorn comes forth of the ground, and hardens and rises at last into the upper air a strong, unswerving shaft, "fit for the mast of some tall admiral;" so does a man, a family, a nation take its permanent set and holds on with it to the end.

The men we have named, and many before and since their day have, if not created, at least moulded the character of the house; and the result is visible in a wise conservatism which has so long distinguished it, and kept out all rashness; while not moored, but anchored, she swims on the upper stratum of the rising tide of medical progress.

Now we indulge the hope that these Hospital reports will ever be made in the true spirit of the old conservative institution, and prove to be what they ought to be, clear and truthful expositions and illustrations of the facts and principles of the cases. We would that a multitude of sure indications, both in the diagnosis and the method, which, we think, are of late too much overlooked or ignored in the description of medical and surgical cases, might have their just, and so, a considerable part in every such relation. It seems to us not enough to present morning, and midday, and evening statistics of the urine; to say just how many times the heart is beating or the chest heaving per minute; for we love to know not only the number but the force of those motions. The once very expressive word synochus—synochus fortis and synocha pulse—which were familiar to the physicians of the earlier days of this century, are rarely heard now. Dr. Cullen's old description of the pulse, "Principio synocha, progressu et versus finem typhus," contains a whole world of doctrine, and ought not to have suffered so great a lapse and eclipse as hides it from the modern student and practitioner alike.

It is not much for one to learn that a pulse is beating one hundred and thirty times a minute, since a rapid run of two hundred yards can make it beat a hundred and fifty times a minute without harm. What care I then for the frequency unless all the rest is made known to me. There is a difference of the greatest import between a synochus fortis of 120

and a typhoid of 120. They differ *toto cœlo* in the prognosis and the indication of method. Our venerable Dr. Rush was accustomed to address us at considerable length on these questions in sphygmology, so wholly ignored at the approaching close of the century.

It may safely be assumed that almost no physician will ever approach his patient without feeling the pulse, a point on which, so far as we know, most part of medical students are left to their own devices for the study of that important section of their knowledge. This was formerly far from being the case; and the lessened modern attention to that subject is the real cause of what we regard as a serious damage and loss as to our best efficiency in the art of healing.

There is varied significance in a slow pulse and quick one, in a frequent and a rare one, in a hard and soft, in large and small, in a tremulous, in a vermicular, a dicrotus, and a halting pulse. These differences and their varied significance used to be dwelled on in our Philadelphia teaching, and we long to see a revival of these good and careful old-time instructions.

In looking out for the diagnosis we love to know all about the hues and translucency of the adnata, which reveal the secrets of many a blood change and many an internal resorption; every movement of the alæ nasi, and the repose or malaise of the muscles of expression are worthy of careful notice and record, while the dryness or humidity of the Schneiderian membrane are as worthy of scrutiny as the tongue and mouth, or the epigastrical poke so rarely ignored. How great is the importance of a knowledge both of the number of respirations in a given time, and the number of cubic inches inhaled at each respiration; it is a key to the knowledge of the rate of oxidation of the blood and tissues on which so closely depends the life-power: they tell us what the brain and heart as well as the lungs themselves are doing.

"Mony a pickle maks a mickle," says the Scotch proverb, and our Dr. Physick would go down to such small things even as sore knuckles in pursuit of useful truth, like a miser who won't ignore scales tho' he likes nuggets better. "Why,

young gentlemen," said he, "I have been many different times called on by persons, who at great expense and inconvenience had journeyed hundreds of miles for the sole purpose of showing me their sore knuckles, which had annoyed them for years and cost them large sums in fees without the least avail. The sore knuckle had been supposed incurable. Very well, then! As soon as I saw an obstinate sore upon a man's knuckle, how should I, how could anybody avoid making the reflection, that the sore must have been kept up by the motion of the joint, which opened and shut the ulcer dozens of times every day so that it could not heal; or that other reflection, that a sore finger, like a broken bone, requires for its treatment nothing more than a splint." The Professor then cut from a card a narrow piece, which he converted by bending it into a half-cylinder, adjusted it to the palmar surface of the sore finger, dressed the sore with a cerate to prevent the bandage from sticking to the edges of the sore, and bound it with a narrow roller. "There! that's all! that will cure your finger!" And there never was a sore knuckle that could not be cured in a few days by keeping the ulcer at rest by means of such a splint, for as a broken leg wants nothing but a splint, so a sore knuckle wants nothing but a splint. He said that his patients were much surprised by the rapid way in which they were cured, to effect which, you see, said he, only a little common sense was wanting. It was this same common sense attribute by which he was distinguished as a practitioner and as a teacher, that led to his great success in the treatment of diseases of the joints, and particularly in the management of morbus coxarius, which he always treated by his carved splint.

Dr. Physick was a great bleeder, and though not so ultra as Guy Patin, or Botalli, he carried the use of venesection to a very great length. He used to tell us that while he was resident and assistant in St. George's Hospital, at London, a man who had fallen from a scaffold, was brought into Mr. Hunter's ward insensible from concussion of the brain. "What shall I do for the man?" said the young disciple to his master. "Shall I bleed him, sir?" "Bleed him? bleed

him, sir? No, sir; you would kill him outright. Wait, sir, until he reacts, and then bleed him—bleed him to death, sir!"

On this text Dr. Physick founded very elaborate instructions for us who were his pupils. A spoken word, ofttimes becomes a guiding idea for a man's whole life, and the hospital pupil never forgot this one.

One day while strolling along Ninth Street near the University buildings, I was overtaken by Professor Dorsey, who hooked arms with me and said, "Come along with me; I will show you a case." We entered a house in Market Street above Ninth, where, in an upper room a man was lying on a bed, pale, breathing very slowly, and perfectly insensible; his pulse was soft and infrequent, and he snored a little at times. This man, said Dorsey, fell from a scaffold, and has got a concussion of the brain. He has no fracture of the skull, and yet see how I am healing him. I have done nothing but wrap his head in this towel wrung out of cool water.

"Is that all that you are going to do for him, Doctor?"

"Yes, all for the present. Don't you remember what John Hunter said to Dr. Physick: 'Wait until he reacts, and then I shall bleed him,—of course I will?'"

Of course we cannot pretend to know how far Mr. Hunter's strenuous expression of his opinion,—as to the actual status of the brain in concussion, while the heart is beating feebly and faintly because the cerebro-spinal axis has received a shock that half deprives it of its innervating force,—was meant to go; but it seems clear that he must have entertained a wholesome dread of the battering power of the reacted heart when impelling its arterial columns into the brain-texture after such a shock and debilitation. For ourselves, however, we do know very well that we have ever looked upon the impulsion-force of a heart roused and maddened into violent reaction as a force truly injective, packing, crowding, and disruptive, under which tissues are melted or broken down as the curtain of a besieged fortress melts and crumbles and is broken down under the driving, disruptive

power of the siege guns. We do not deny that venesection may and even has been sometimes recklessly practised, for we are familiar with Botalli and Guy Patin, and Valot and Guénault, *et id genus omne*, with old Fagon at their head; but we have heard Dr. Physick, in the latter years of his life, say that his regret as a professional man retiring from the active pursuits of business was, not that he had bled too much, but that persons had died under his care because he failed to do his whole duty in that preventive and conservative service from want of the needful resolution and firmness. Yet Dr. Physick was by no means a Sangrado. In our young and doubting days we often appealed to him for help and direction; and though we had scrupulously attended at his lectures and illustrations at the University of Pennsylvania, more than once did he terrify us by the exhibition of his dash in the practice of his art. One instance out of many may illustrate our meaning. It was long ago that a woman fell under our charge laboring with a terrible conjunctivitis, one so extremely violent as to threaten her with loss of the eye through ulceration of the cornea, or by a complete glaucoma to which it might perhaps have led. The Professor had filled our mind with a conviction that he was right in pushing the use of bloodletting to *outrance* for the purpose of reducing the injection-force of the heart to a proper balance with the resisting power of the minute arteries and capillaries of the conjunctiva. He had instructed us to bleed daily until this balance of forces should be effected. Accordingly Mrs. Smith, who was agonized with pain, was duly bled, to-day, to-morrow, the next day and next morning, and so on until at last she fainted so badly that terror laid hold on us, and we fled for shelter and for succor to the good man's office in Fourth Street. He was very pale, very sick, and very feeble; yet, said he, "I will meet you at Mrs. Smith's at ten o'clock to-morrow morning."

Now, I declare that my very copious and repeated bleedings, and all my lotions and cataplasms and eye-waters had not in the least discernible degree lessened the pain, the

engorgement, or the redness of Mrs. S.'s conjunctiva. She was half blind already, when, at ten o'clock, Dr. P. accompanied me to her darkened chamber. "Give me a little light from yonder window," said he, after examining the pulse. "Open the shutter a little wider." Then touching the lids he looked into the eye, and, after the briefest glance at it, said, "That will do." "Good morning, madam," and we left the room.

"Now, Dr. Physick," said I, "I have fully and boldly carried out your plan in the treatment of this ophthalmia, for I have copiously bled my patient daily until I am ashamed and afraid to do so again, because at the last operation she fainted so badly as to greatly alarm me. I fear I am not far from the disgrace of losing an eye in my practice—a disaster I cannot contemplate with patience. What can I possibly do now?" "Who is your bleeder?" "Mr. Conrad Ripperger." "Very well; pray, Doctor, send for Mr. Ripperger to take twelve ounces from the arm this morning, and ask him to meet you again at ten to-morrow to bleed her again, provided she should not appear very much better at your next visit."

I well remember how shocked I was by this decision, and that I told him that it was very hard for me to be convinced, but that I willingly acknowledged his superior wisdom and authority.

Mrs. S. having been duly bled, Mr. Ripperger was on hand at the appointed hour of the following day; and truer words were never spoken than these, that on looking into the eye I could discover only faint traces of the very violent and obstinate inflammation, for virtually she was cured already. Mr. R. did not repeat his operation, and Mrs. Smith's eye was shortly and perfectly restored to health.

Many and many were the instances of dangerous ophthalmia that I treated successfully in that line afterwards—a line in which I should have continued to fight it, were it not that I many years afterwards learned that nitrate of silver may be so posologically adjusted as to give to its contacts a destructive, an alterative or curative, or an indifferent force at

my option. The important invention of the applicability of nitrate of silver to all accessible superficial inflammations, set aside the common necessity and indispensability of venesection to that degree that might have ravished with joy and triumph the best bleeders of the court of Louis XIV, or of the Virgin Queen's at the courtship of the Duke D'Alençon. Anybody may understand this who will read Guy Patin's letters, or Botalli's book.

If the relation of this incident should happily serve to amuse or interest the reader as illustrating the modes of now long-gone years, we may venture to hope that the following anecdote may in like manner be accepted as a slight yet not unwelcome illustration. We for our part should be very glad in the possession of a diary filled with the whole aspects and words of the Bonds, the Jones's, the Redmans, Kuhns, and indeed of every man who has served in the Hospital from 1755 until now.

It was in the early winter days of 1812 that, along with a crowd of fellows from Pennsylvania, Maryland, Virginia, the Carolinas, and Georgia, as well as the great West, we were walking the Hospital at the heels of our venerable master, Professor Benjamin Rush. We had come out of the door of the east or cross building in the second story and were passing now into the men's medical ward. Dr. Rush pushed open the door and was stepping into the ward when he suddenly stopped, and looking back upon us, the crowd, said, "Stop a moment, young gentlemen, if you please; I have an instruction to give you as we stand here at the door." Then, pointing diagonally over the ward to its northwest corner, he continued, "Please to look yonder, in the corner of the room, where that poor man lies who has been so long and so dangerously ill. I wish you to note that he is now lying upon his side. That's all for the present. I call your attention to the circumstance now, but purpose to explain myself more fully when we reach his bedside in due order."

Probably not one of us had the least idea of what he meant, and we continued to press around and near him as

he went from bed to bed on either side of the ward, explaining to us the state and meaning of the symptoms and the indications, until at length we came together in the northwest corner of the ward, at the couch of the supposed hopeless case of nervous fever.

The patient, ill with what in that day (so long before M. Louis) was known as nervous, but now recognized as typhoid fever, had been found at every successive visit growing more and more hopelessly ill, and having been for several days profoundly insensible, lying always upon the back, without power to move, led us to expect his death; but now, when we again stood around his couch, Dr. Rush said, "You remember, young gentlemen, that when we entered the ward by yonder door, I stopped, and called your attention to the fact that this man was lying on his side, as you now perceive, and this was the first time for many days. I took it for granted that his strength was increased, as he could not have done so else; for a man in a low nervous fever, entirely insensible, and barely still alive, can by no means change his dorsal to a lateral decubitus. I was much pleased, gentlemen, to observe this favorable omen from the door, and now you will find by his pulse, his breathing, his improved animation, for he actually recognizes and speaks to us, that he is decidedly better, leading us to expect that the crisis is past, and that he will entirely recover ere long." The man did recover, but we never lost any part of that simple, undertoned, but deep-graved lesson in diagnosis and prognosis. If Dr. Physick taught us common sense about sore knuckles, Dr. Rush taught us common sense on the decubitus of sick people, on their gestures and the whole expression of the figure.

This was the way in which the good man taught us to turn mony a pickle into mony a mickle. The little incident fructified in our intelligence for more than fifty-five years of practice, and ofttimes guided us, and guided us surely and safely in the obscure and devious paths of our medical observations and actions.

It appears to be true to say that the hospital never has

boasted herself of her numerous various and brilliant operations in surgery, her prophetic prognoses, or her miraculous diagnostications and therapeutic triumphs, unless it were that somehow the rumor got abroad that she was proud of the conservative surgery, which if not created and carried out, was at least set upon its plinth by Dr. J. Rhea Barton, where we hope it may forever stand firm and immovable.

Indeed, she has never opened her lips to speak until to-day through these printed reports. Let these Pennsylvania Hospital Reports then be the true representatives of the spirit and power of her inner life—plain, sober, discreet, honest, exact, and that shall be all we will ask of her hands in this relation.

We would ask, is this journalistic medicine? We fain hope not. Medical journalism is very much newspaperism, if we dare use such a word, and in so far is a very good thing, for newspapers can enlighten, but not alone educate mankind. Journalistic medicine has for thirty or forty years past had a long day of high-jinks, and there has been much joy in those days, for journals have scattered far and wide in the land and the world, and cheaply, every imagination of the thoughts of the hearts of physicians and surgeons, and have been so convenient, so pleasing, and so instructive, that they have satisfied the cravings and the conscience of the medical people, who but for these swimming-bladders to tide them over their study hours, might perhaps have held fast to the solid land of our real, venerable, and solely true teaching, classics and standards, that have been so long floating down the ocean of medical learning. We fear that our late distinguished friend, Dr. John Forbes, was but too well justified in his declaration that "few English physicians purchase medical books, and still fewer read them." Where are we going?

Good hospital reports do not really belong to the class of journalistic literature. They are rather true *ex cathedra* or collegiate expositions, or exegeses, higher than journals, and not up to the rank of the more comprehensive formal treatises. While therefore we are glad to see them, if they be

only wise and true and clear, we would in no wise disparage the wholesome criticism and lavish information of well-conducted journals, even though wearisome by perpetual repetitions and reiterations due to the excess of competition.

Retired as we now have long been from all active participation in the busy pursuits of medical men, in which for more than half a century we took a passionate interest and delight, we rejoice to believe that there is to be, and even now is, an increased disposition to advance the standard of medical learning and philosophy by a common revival of the spirit of study by which the profession was so greatly exalted in the fifteenth and sixteenth centuries. That error will in the end prove harmless where reason is left free to combat it, is a true saying, and even the greatest of heterodoxies that the world ever witnessed in the class of medical practitioners is fading slowly away, just as the meridian sun fades out every blinking, twinkling star, begotten of mist, and fog, and mud. It has ever been to us a cause of astonishment, that in the blaze of the nineteenth century so great an insult to the entire scholar class of mankind should so long have been cheered onwards by both the pauper and the wealthy class of dupes. Surely the general public has never perused the pages of Hahnemann, which describe the thirty vials and the two up and down shakes down to the decilionth power. Even secretaries of state and Medicean merchants have surely ignored those wondrous manipulations and philosophies of Hahnemannism. Count Gobineau says, that civilization has been struggling upwards for 15,000 years, has reached its culmination, and is now much beyond the meridian. The word Hahnemann might serve to strengthen his belief that in another series of 15,000 years it will have sank back into man's original stupid ignorance and barbarism.

We shall in concluding this article append a list of all the physicians and surgeons who have served the Hospital from its beginning. During the earlier years of its existence they were elected simply as medical officers, and themselves

chose the post they desired. We find thus acting, some as physicians, others as surgeons, Loyd Zachary (1751–1753), Thomas Bond (1751–1784), Phineas Bond (1751–1773), Thomas Cadwalader (1751–1777), Samuel Preston Moore (1751–1759), John Redman (1751–1780), William Shippen (1753–1778), Cadwalader Evans (1759–1773), John Morgan (1773–1777; 1778–1783), Charles Moore (1773–1774), Adam Kuhn (1774–1781; 1782–1798), Thomas Parke (1777–1823), James Hutchinson (1777–1778; 1779–1793), William Shippen, Jr. (1778–1779; 1791–1802), John Jones (1780–1791). From the time of Rush the physicians were, Benjamin Rush (1783–1813), John Foulke (1784–1794), Benjamin Smith Barton (1798–1815), John Redman Coxe (1802–1807), John C. Otto (1813–1835), Samuel Calhoun (1816–1821), John Moore (1820–1829), John Wilson Moore (1821–1827), Samuel Emlen (1823–1828), John K. Mitchell (1827–1834), Benjamin H. Coates (1828–1841), William Rush (1834–1837), George B. Wood (1835–1859), Thomas Stewardson (1838–1845), William Pepper (1842–1859), Francis Gurney Smith (1859–(1864). While as physicians to the lying-in department occur the names of Thomas C. James (1807–1832), Charles Lukens (1829–1839), Hugh L. Hodge (1832–1854), Charles D. Meigs (1838–1849), Joseph Carson (1849–1854). The surgeons during the period mentioned were, Caspar Wistar (1793–1810), Philip Syng Physick (1794–1816), John Syng Dorsey (1810–1818), Joseph Hartshorne (1810–1821), Joseph Parrish (1816–1829), Thomas T. Hewson (1818–1835), William Price (1821–1823), John Rhea Barton (1823–1836), Thomas Harris (1829–1840), Jacob Randolph (1835–1848), George W. Norris (1836–1863), Edward Peace (1840–1861), George Fox (1848–1854), John Neill (1852–1859), Joseph Pancoast (1854–1864), Edward Hartshorne (1859–1865). The members of the present staff will appear from these Reports.

# LACERATION OF THE FEMALE PERINEUM:

## ITS HISTORY AND TREATMENT.

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When it is considered that the female perineum measures in its normal condition from one to one and a half inches, and yet, during the final act of parturition is extended to four and a half—perhaps five—inches, and of course greatly attenuated, it is not surprising that a separation in its continuity should frequently occur.

Such accidents doubtless take place in a large majority of cases from ignorance or carelessness on the part of the medical attendant; and yet may and do happen, in the hands of the most competent and expert practitioners. The consequences which often ensue are so peculiarly distressing and mortifying to the female, as to debar her from the companionship of friends, render her offensive to herself, and seriously to undermine her health. In some degrees of this injury the patient's situation is infinitely worse than when afflicted with a vesico-vaginal fistula; and like the latter, until a comparatively recent period, was deemed beyond the compass of surgical resource. It is almost exclusively the result of parturition, though occasionally we hear of such lacerations from external violence, as falling astride the back of a chair, or as in the case related by Prof. H. H. Smith (Smith's Surgery, vol. ii, page 555), where the injury was produced by the horn of an enraged deer.

Partial lacerations are by no means uncommon, and even extensive ones, I am disposed to believe, exist to a degree not generally suspected. Many females, from motives of delicacy, timidity or hopelessness, carefully conceal such, suffering in silence the many evils which they entail. The successful management of these, in any degree, constitutes one of the most important triumphs of modern Surgery; and if there is any class in this world, more than another, placed under unbounded obligations to cherish and respect our art, it is the mothers of the land.

## Anatomy of the Female Perineum.

The subject of this paper cannot be well understood without some presentation of the anatomical components of the female perineum. It extends, in a restricted sense, from the commissural connection of the labia majora to the anus. The two canals, vagina and rectum, as they approach their terminations—vulva and anus—recede from each other, leaving a triangular space into which the deep portions of the perineum extend. (Fig. 1.)

Fig. 1.

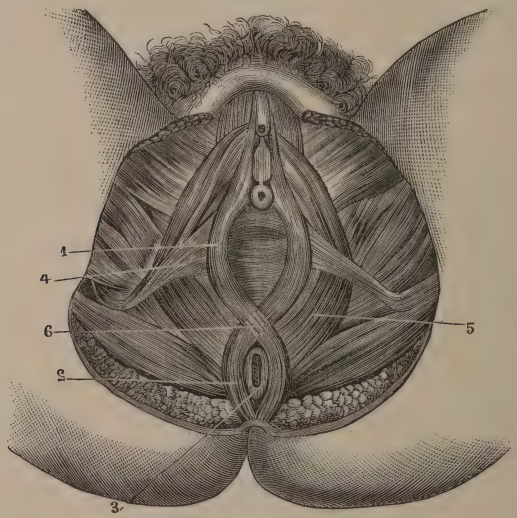
1. Vagina; 2. Rectum; 3. Triangular notch or space into which penetrates the perineum.

Just within the posterior commissure of the labia majora, is a transverse duplicature called the *fourchette*. This is al-

most constantly torn across in the first labor, but is followed by no inconvenience whatever. The skin and superficial fascia being removed, the muscular apparatus is exposed; consisting of the external sphincter ani. Its origin commences at the coccyx. At the posterior side of the bowel it separates into two elliptical planes which surround the anus, unite in front and become inserted into the perineal centre. Below this lies a strong muscular ring, surrounding the lower end of the bowel, the sphincter ani internus. At the perineal centre commences the sphincter vaginæ, continuous with the fibres of the sphincter ani, and passing forwards on either side of the vagina, is inserted into the cavernous portions of the clitoris.

On either side, arising from the ramus of the ischium, are the transverse perineal muscles, inserted into the constrictor vaginæ. In like manner, on each side, there is a levator

Fig. 2.




1. Sphincter vagina; 2. Sphincter ani Externus; 3. Internus; 4. Transversus perinei; 5. Levator ani et vaginæ; 6. Perineal centre.

ani stretching between the pubic bone and the spine of the ischium, and inserted into the side of both the vagina and rectum. (See Fig. 2.) With a knowledge of these muscles,

their attachments and direction, it will not be difficult to understand the displacement of parts which follows lacerations, and which we shall have occasion to refer to presently.

*Period of Occurrence.*—As might be expected, these accidents are largely confined to primiparæ. I. Baker Brown, whose experience has been very great in this as in many other diseases incident to the female sexual system, states that in eighty-six cases operated upon, sixty-four occurred in first labors, and in those which have suggested this paper, all were in the persons of primiparæ, none of whom but two at the time of the injury exceeded twenty-five years of age.

*Causes.*—These may be arranged under three heads. *First*, such as relate to the mother; *second*, to the child; and *third*, to instruments. Under the first, may be mentioned powerful expulsive uterine contractions extruding the fœtus before the parts are sufficiently extended; or an unyielding perineum, its tissues being rigid; or where the muscular structure is deficient in tone and inadequate to react against the pressure of the advancing head; and again, where the uterine contractions are suspended at a period when the perineum is greatly stretched, and then, without premonition, recommence with unusual power. In such a case laceration occurs in one of two modes; either by the muscles contracting powerfully to meet the emergency; or by their being so enfeebled by protracted extension, as to be powerless to resist.

The form of the perineum itself must not be overlooked. There are congenital peculiarities which complicate the mechanism of a labor, resulting from redundancy of tissue associated often with an unusual straight sacrum, in consequence of which, the presenting part of the fœtus tends to direct protrusion instead of being deflected in the axis of the pelvic curve.

Under the *second* head are such as relate to the child. Of these may be specified unusual size of the head or breadth of the shoulders, either from natural or morbid causes, demanding for their passage an extraordinary dilatation of the vaginal outlet; or, unusual positions of the fœtus. It is a question by no means clear, whether the passage of the

shoulders does not often produce the damage ascribed to the head.

The *third* cause of lacerations is the use of instruments. These come in usually for a very large share of animadversion, but it is only in unskilful hands they can be said to do harm in this way. If a child is dragged through the maternal passages without regard to the existence of a pelvic curve or the principle of the lever, then, indeed, great damage may be done; or if the accoucheur, before he has the blades of his instrument adjusted, allows himself to be surprised by the sudden expulsion of head and instrument together, the parts may, indeed, be seriously wounded. One of the most fearful perineal lacerations I have witnessed, extending some distance up the rectum, was produced in this manner. In the hands of an expert, instruments I regard as among the most valuable resources of obstetric surgery, preventing the very results which they are often charged as bringing about.

*Degrees of Ruptured Perineum.*—First. Where the laceration extends back from the posterior commissure toward, but not into the perineal centre.

Second. Where the laceration extends from the posterior commissure of the vagina to the verge of the anus, but only involves the skin and subcutaneous cellular tissue.

Third. Where the laceration extends from vagina to rectum, dividing not only the skin and fascia, but both the sphincter vaginæ and sphincter ani externus, and in some instances the vagino-rectal septum with the sphincter ani internus.

Fourth. Where the perineum is perforated by the head passing through the perineal centre, and leaving the sphincter of the vagina and the sphincter of the bowel unsevered.

*Results.*—These will depend on the degree of injury. If it be only the division of the posterior commissure, it amounts to nothing; but if beyond this, then every line entails some disqualification. Then follows a descent of some or all of the pelvic viscera. This displacement is often accompanied with irritability of the bladder, compelling the patient to

pass urine very often; dragging sensations, pain, and great weariness in the loins, and inability to walk without great inconvenience. Symptoms of indigestion will frequently appear, the appetite fails, bowels become distended with flatus, and a train of nervous troubles comes on apace. But there is still a greater calamity, before which all others sink into insignificance. It is present when the laceration involves the sphincters of the bowel, and perhaps the vagino-rectal septum. All control over the intestinal contents is lost; the fæces and gas pass incontinently; the person is ever and anon soiled with the dejections; the escape of wind from the bowel produces necessarily mortification; a disgusting odor adheres to and emanates from the body; friends shun her; those who should cherish her, minister with reluctance to her necessities, and she is compelled to impose a seclusion worse than death itself. To rescue a patient from so dreadful a prison-house, ranks among the noblest achievements of surgery. It not only blesses the miserable sufferer, but it is reflex. It makes the surgeon go on his way rejoicing, in the consciousness of being instrumental in the hand of God of doing so great a good. Such are the threads of gold which run through the complex mechanism of professional toil, and inspirit the heart amid so much calculated to weary and depress.

*Deformity from Laceration.*—When the laceration is slight, it only seems as though there was an unusual antero-posterior extent of the vulva. When, however, the muscles are severed, the departure from the normal appearance is very marked. The anal extremities of the labia majora are drawn widely asunder by the transverse perineal muscles, and curled upward by the contraction of the segments of the sphincter vaginæ toward their origin aided by the anterior fibres of the levator ani. When the septum between the rectum and vagina is torn, the mucous membrane of the former often projects in redundant folds into and even above the fissure, also downward, resembling in some degree a prolapsus ani, which, indeed, it is, brought about by those fasciculi of the levator ani muscles, which influence the anterior portions of

the sphincter, dragging them upward when once disengaged from the perineal centre. These deformities increase by age, and the chasm grows wider until cicatrization is completed, when there is some little diminution.

*Prevention.*—Every obstetrical writer devotes a portion of his chapter on the process of labor to the support of the perineum. This would seem to be a very natural and reasonable demand, but there is considerable discrepancy of opinion about it. There are not wanting those who deny entirely the necessity for such a precaution. Among the Germans, there are Sacombe, Faust, Wigand, of the older class; and Mende (Beobachtungen und Bemerkungen aus der Geburtshülfe und gerichtlichen Medizin, Göttingen, 1825), who are entirely opposed to supporting the perineum. Mende declares nature provides all remedies against its injury. V. Siebold (in the Journal für Geburtshülfe, Bd. v, Hft. 1, s. 63), takes occasion to contradict and expose these views at some length.

In France, Pinel Grand-Champ, Danyau, expressed themselves opposed to support, asserting that such was positively injurious. And in England, Thompson (Frorieps Notizen, Bd. 7, No. 18, 1824), uses very similar language. In the latter part of the fourteenth century, Eros or Trotula, in the twentieth chapter of his book (de Passionibus Mulierum, quoted in I. Spachii Gynæciorum, etc., ed Argentinæ, 1597, fol. 50), says, "Ad periculum evitandum (rupturæ pudendorum) eis in partu sic providendum est: præparetur pannus in modum pilæ oblongæ et ponatur in ano ad hoc, ut in quolibet connatu ejiciendi puerum, illud firmiter ano imprimatur, ne fiat hujusmodi continuitatis solutio."

Roder and Stein virtually agree with him, as they advise the insertion of two fingers into the rectum to guide the head in the proper direction. Schaffler (Hufeland's Journal der praktischen Heilkunde, Bd. xiii, 3 st., 1802) recommends one hand placed on the os sacrum, and drawn, while pressing softly, toward the perineum, in order to gain more skin for the latter, at the same time, with the palm of the

hand, to give the head an upward direction. Wigand also recommends rubbing the skin upward from the thighs toward the genitalia. Such manipulations can be of very little use. Nedel, Stark, and Stein, Sr., counsel proper support with the hand and the use of fatty oils.

Niemyer sustains the perineum in the hollow of the hand, leaving one inch back of the posterior commissure free, the pressure to be made in the axis of the inferior strait. Barlow advises support until the perineum is well distended, then allows it to take care of itself. Nedel places only his thumb across the *fourchette* (Vorschlag einer neuen verfahrungsart die Ruptur des Perinäums bei der Geburt zu verhüten und die Erfolgte zu heilen. Magdeburg, 1806, s. 51). The object of this method is to sustain the point only where usually the rent commences.

Hohl recommends a particular method, placing the ends of four fingers on the fœtal head, close to the posterior commissure, and the thumb on the opposite side of the head, near the arch of the pubes, thus both restraining and guiding its delivery. There is certainly very little support furnished to the perineum by such a plan, but it is not without its value in preventing the too sudden expulsion of the child before the maternal tissues are prepared.

Heine and Müller counsel the side position as calculated to prevent rupture.

Burns advises pressure, uniformly applied over the entire perineum, until the head passes, and particularly to the posterior commissure, charging the woman not to bear down during the presence of a pain. Mr. Burns evidently never passed through the throes of childbearing, or he would have omitted the last recommendation of the sentence; not to bear down in such an extremity is simply impossible.

Denman retards the head partly by pressure made directly against it, and partly by the hand planted against the perineum. The object here is to detain the head until the parts are sufficiently yielding.

Hamilton so applies the hand that the part which sustains the greatest pressure shall receive the principal support.

During the intervals of pain he directs the perineum to be rubbed with lard, and, when the head is emerging, to lay the fingers against the posterior part of the vulva, and pressing the perineum toward the pubes.

Busch recommends the fingers being planted against the head, to prevent its being driven out too suddenly, and, when this is not likely to occur, to support the parts by placing the balls of the hand on the posterior commissure, the palm on the perineum, and the fingers along the sides of the anus; supporting only during the presence of a pain, and never strongly opposing the fœtal advance. During the escape of the head and the retraction of the perineum the supporting hand should follow the latter carefully. He is unfavorable to using the uncovered hand.

V. Siebold, during the intervals of pain, rubs the skin of the thighs toward the perineum, and during the presence of pain gives a very gentle support. He does not, as Busch observes, sufficiently insist on uniform pressure.

Carus says it is only necessary to give the posterior commissure sufficient background by pressure. He evidently has in mind the old maxim *obsta principiis.*

Mesnard thought it only necessary to push the coccyx backward, or place two fingers between the head and perineum.

Pinel Grand-Champ says support is not only useless but injurious.

Mende, of Göttingen, published the same opinion.

Dr. Hodge enforces pressure, especially supporting the posterior commissure.

Dr. Meigs enjoins the same, using a napkin supported by the hand.

Ramsbotham uses a napkin as a matter of delicacy, maintained against the perineum by the hand.

Cazeaux employs the hand alone.

Velpeau directs the hand to be wrapped in a napkin and placed transversely, the cubital edge toward the coccyx.

What is to be done when, in consequence of the great size of the fœtal head, or some unusual peculiarities of the perineum, its laceration becomes inevitable?

Michaeles (Lucina, Bd. vi, Hft. 1), recommends incisions in the perineum; and Siebold, in discussing this same subject, insists the incisions should be made where there is least tension, or where the head presses least.

Ritgen takes a similar view, but confesses there is such a repugnance to it in civil practice that he has not been able to do it. Neither has he done it in hospital service.

Blundell not only advocated, but practised slight incisions; to be made laterally, and to be done during the presence of a pain.

M. Paul Dubois also directs an oblique incision.

Chailly-Honoré concurs in the same practice, believing that even should the incision become a laceration, its direction will be such as not to incur the disastrous consequences which ensue in a tear through the raphe.

Dr. Simpson, of Edinburgh, advocates the practice.

Dr. Penrose, Professor of Obstetrics in the medical department of the University of Pennsylvania, teaches the propriety of incisions in extreme cases.

Dr. Wallace, of the Jefferson Medical College, thinks the necessity for such a course can scarcely arise.

Dr. E. Wilson, long connected with the Nurses' Home as a teacher of Obstetrics, opposes the practice as unnecessary.

In speaking on this subject D'Outrepont objects to the operation, on the ground that this cut, once started, may soon be converted into a tear, extending even to the anus.

Busch thinks these incisions should be confined to cases of organic anomalies only.

The cases demanding such an operation must certainly be extremely rare, and the danger in inculcating it is, that it will be abused by practitioners of limited experience becoming unnecessarily alarmed, and resorting prematurely to the knife.

The accident may be prevented again by resorting to the forceps—a practice advocated by Moreau, Busch, and Hütter.

The employment of ether or chloroform will conduce to the preservation of the perineal structures by the relaxation which is secured, and also by rendering the patient insen-

sible to that acute suffering which provokes the violent contractions of the perineal muscles.

I think, from all that has been quoted, we may conclude the perineum demands support as a precautionary measure. That the bare hand is the proper support, as it communicates to the mind information which could never be perceived through an interposed napkin, and should not be applied too early. That the *degree* of pressure should be properly graduated and regulated by the necessities of the case, and only made during the existence of pain, and the *direction*, so as to prolong the curve which coincides with the axes of the straits. To this end, the palm of the hand should be applied against the perineum, so that the balls of the thumb and little finger shall rest just in front of the anus, and the fingers on the posterior commissure of the vulva. Thus adjusted, the pressure should be, at first, firmest posteriorly, so as to deflect the head toward the pubic arch, and then, during its exit, well and securely applied to the posterior margin of the vulva.

## History of Lacerated Perineum.

There is a grand ongoing in all human history. And in no department of science or art is the march more rapid than in our own. No physician imbued with the true spirit of his profession, can fail to be interested in tracing the progress of a great surgical problem through all the stages of supposition, experiment, and fact. Such a study will increase greatly our faith in this noble calling, and moderate surgical dogmatism. A sound surgical mind will be exceedingly cautious in asserting impossibilities. The experience of the last fifteen years goes to add significance to this observation. The methods of cure may be arranged under two heads,—*Position* and *Suture*.

Lacerations about the perineum did not escape the notice of Celsus, but he had no remedy except securing the limbs together and enjoining perfect rest.

Ambrose Paré recognizes the injury, and recommends the use of sutures. The same may be said of Mauriceau,

but there is no evidence on hand to show either had ever employed them. The first recorded case of operation, is that of Guillemeau (Surg., page 354, chap. viii). The rent occurred in a former labor, and was of an aggravated kind, extending through the whole length of the perineum, and laying both cavities into one. This case must have inspired all future operators. The edges were pared alike—not cutting much flesh but principally skin and fascia—a needle was passed through the sides of the wound, and a thread wrapped about it, by which the parts were drawn together. This formed the twisted or hair-lip suture. He next inserted several interrupted sutures, and in fifteen days the case was cured. As Guillemeau was a pupil of Paré's, it is probable he received from his master the hints, which, in this case, were reduced to practice. The valuable work of Busch and Moser contains an excellent article on the plans of various authors.

Among those who advocate position alone are to be found many distinguished names. (Thymoeus Collect. de Peonet, tome iii, page 96. Peu, Pratiq. des Accouchemens, page 422.)

These parties assert that complete ruptures, by which is meant lacerations extending to the anus, heal without any treatment. De la Motte, however, does not seem to repose implicit faith in their assertions, as he mentions one of their cases which did not heal.

Deleurye (Traite des Accouchemens, page 320), agrees with the above authors, in some degree, saying large ruptures can be cured without any suture; and to the same import is the language of Puzos (Traite des Accouchemens, page 134). "These wounds," says our author, "can be cured as well by approximating the thighs as by sutures."

Aitken (Principles of Midwifery, 1788), rejects sutures altogether.

D'Outrepont says extensive lacerations heal spontaneously by position; and such is the opinion of Busch and Moser. Besides these may be mentioned Paletta, Exercitationes Pathologicæ, pars. ii, Mediolani, 1826. *Gardieu*,

Traité complet d'Accouchemens, tom. iii (Sedillot, Recueil périodique de la Société Médicale de Paris, tom. iv). Boyer and M. Duparcque (the latter the author of the paper published in Paris in 1836, entitled Histoire complète des Ruptures et des Déchirures de l'Uterus, du Vagin, et du Périnée). To these may be added the name of Dr. Waller, who declares having seen ruptures traversing the entire perineum, and laying both cavities into one, get well, and the control over the intestinal contents return; no treatment having been adopted but position and cleanliness. And not only so, but goes further and states, "most cases which have come under my observation have done well." It would have been more satisfactory had he defined his understanding of the term, "*done well.*" An injury to the extent just stated can never do well.

Blundell thinks there is little to be hoped from operations, failure being the rule; and the same testimony is furnished by Dr. Davis. Ramsbotham describes the injury, but as he indicates no treatment, it is not probable he viewed the suture with favor.

Dr. Cockle, in a paper published on Laceration of the Perineum, in 1853, as quoted by I. Baker Brown, advises against sutures, especially in the early stages.

*The Suture.*—The advocates for suture are both numerous and respectable, among whom we may name Moreau and Smellie, neither of whom, Busch says, ever performed it, although it received their sanction. De la Motte (Traité complet de Accouchemens, page 761, Obs. 401). Also Morlanne (Journal des Accouchemens, tom. i, p. 188). Saucerotte (Journal general, tom. iv, p. 417). Noel (Idem, tom. vii, p. 187). Montain (Idem, tom. lxxvi, p. 140). Mayo (London Medical and Physical Journal, September, 1828). Bond (The London Medical Repository, &c., by G. M. Burrows, No. 128, August, 1824). Churchill (Idem, No. 126, June). Alcock (The London Medical and Physical Journal, vol. xliv, September, 1820). Rayer (Edinburgh Medical and Physical Journal, No. lxxvii, October, 1823). Campbell (Idem). Zang (Darstellung blutiger heilkünstlicher Operationen, iii, Th.

.1, Abth.). To this list we may add, Osiander, Williams, v. Fabrice, Ritgen, Meissner, Langenbeck, Royer, Häfer, Mercogliano. D'Outrepont, Dupuytren, Rauley, Roux and Dieffenbach, all of whom record cases with good results by the suture. Roux asserts there never was a case of satisfactory cure if left to nature (Gazette Med., 1834, p. 18). His method consisted in approximating with quilled sutures, aided by interrupted ones at a few intermediate points, and the use of semilunar incisions where there was much strain on the sutures. Duparcque says no union, in a proper sense, can occur unaided.

Chelius may be named as an advocate for the suture; also Menzel, Wutzer, M. Verhæghe, and Kilian. Velpeau recommends the suture and Dieffenbach's incisions. Chelius (vol. ii, p. 38), while he favors an operation, thinks the consequences are very uncertain, and on page 39 of the same volume, the editor, Mr. South, records a successful case by Dr. Davidson taken from the pages of the Lancet, 1838–9, vol. ii. The suture used was the quilled, and to counteract the tendency to eversion, the gum cylinders were drawn toward each other by a piece of tape. Roux, in order to correct this effect of the quilled suture, inserted a few interrupted ones.

Burns (Principles of Midwifery, vol. i, p. 58, edition 1820), recommends sutures strongly, when reunion cannot be effected by other means. Although the American editor, Prof. James, in a footnote on same page, says they (sutures) should rarely be had recourse to, as they give great irritation. I. Baker Brown incorrectly states Burns makes no mention of the accident.

Dieffenbach, in 1829, turned his thoughts to rupture of the perineum, and after a thorough contemplation of the entire ground, concluded these accidents ought not to be left to nature. The substance of his conclusions may be summed up briefly as follows: Immediate operations; the use of either the twisted or interrupted sutures; in secondary operations, the edges being previously well pared; semilunar incisions on either side, when the approximation makes

much strain on the sutures; transplantation in cases attended with great loss of substance; opium in sufficient amount to keep the bowels bound for several days, and the removal of the urine by the catheter as occasion may require.

Nevermann (in a German translation of Duparcque'), having noticed that stonemasons receiving lime into the eye, in twenty-four hours had the lids and ball adherent, suggested that the margins of a laceration should be subjected to a similar treatment by applying quick-lime, and then securing the limbs together.

Langenbeck, with his usual ingenuity, presents us with a method which is termed *perinæo synthesis*, the description of which is given by M. Verhæghe, of Ostend (in his Mémoire sur un Nouveau procédé Opératoire pour la Guérison des Ruptures Complètes du Périnée, Bruxelles, 1852). This monograph I have not been able to peruse, but glean the leading features of the plan from I. Baker Brown's excellent treatise on rupture of the perineum. The first step consists in freshening the free border of the recto-vaginal septum; next, splitting the septum, the anterior layer of which is designed, after the laceration is united, to be brought down, and stitched by its angles, to the front part of the newly joined perineum, thus protecting the parts against the vaginal discharges. After this, the edges of the laceration are pared, extending forward to the posterior commissure of the vulva, avoiding the mucous membrane of the vagina. Then comes the approximation. After the cessation of bleeding, the rectum is first closed by a suture, inserted with Wutzer's curved needles; then the perineum by interrupted and twisted sutures, and lastly, the attachment of the anterior part of the septum. To relieve tension, he employs the incisions of Dieffenbach, directs vaginal injections of an infusion of chamomile, catheterism, low diet, and opium in sufficient quantities to maintain constipation until after the removal of the sutures.

Bernard and Huette (Operative Surgery, page 454) are very brief, recommending position, if the case is recent; if old, vivifying the edges, uniting by the quilled suture, as

practised by Roux, and making the Dieffenbach incisions if demanded. They state the threads should be allowed to remain until complete cicatrization takes place, union by the first intention not being expected.

Guerin (Chirurgie Operatoire, page 578) approves of Roux's operation with Dieffenbach's incisions.

Sedillot (vol. ii, p. 441) reiterates the same views.

Vidal (Pathologie Externe, tome v, p. 755) speaks favorably of Roux and Dieffenbach's methods; and so also Dugeré (Des Dechirures du Perinei, 1856).

C. Clay, speaking of the accident, in 1856, advises quilled sutures, catheter for twelve or fourteen days, rest and cleanliness. The sutures, he says, should be removed the seventh day.

Miller (Princip. Surg.) treats the subject with great brevity, but is not adverse to operations.

Skey, in his Operative Surgery (1858), makes no very encouraging allusion to the subject, but recommends the operation of Brown.

Holmes's Surgery, vol. iv, has an article on ruptured perineum, written by Mr. Hutchison. He recommends an immediate operation and position; observing, that even should the lochial discharge and bruised condition defeat the healing occasionally, nothing will be lost by the attempt. Where the sphincter ani is torn, he thinks relief from incontinence may be promised, but not so surely that from prolapsus of the uterus. A great deal, he says, depends on extensive denudation, so as to have a deep mass to support the pelvic viscera. The sutures recommended are either the quilled, or what he likes better, a perforated metal bar, with wires passed through, on the ends of which are clamped shot, and secured by being twisted round cylinders of wood. He also advises dissecting up from the septum a flap consisting of mucous membrane, after Langenbeck or Fricke, and bringing it down to be attached to the restored perineum. The sutures he removes the sixth or seventh day.

M. Jobert (De la Réunion en Chirurgie, 1864) advocates the use of what he terms the *serpentine suture*, to be formed

out of silk thread, and inserted by curved needles. The description is not clear.

There is, however, one name among British surgeons prominently associated with this subject; it is that of I. Baker Brown. His experience in the treatment of injuries of the perineum has unquestionably been greater than that of any other surgeon. From 1853 to the present time his cases have been accumulating, until they number, as published in the last edition of his book, 1866, 112 cases, 104 of which were cures. So completely has the operation been vindicated, that no treatise on surgery, recently published, fails to devote a chapter to lacerated perineum.

The leading features of Baker Brown's operation are extensive denudation; quilled sutures, with interrupted ones; division of the sphincter ani on each side, and keeping the bowels quiet with opium.

Among American writers, it may be said very little attention has been given to the subject. No allusion is made to the injury either in the works of Dorsey or Gibson. Prof. H. H. Smith (Smith's Surg., vol. ii, page 555) describes the accident and its treatment, adopting the plan of Baker Brown.

Dr. Mettauer, of Virginia, published a remarkable case (American Journal of Med. Sciences, vol. xiii, p. 113, 1833), in which the rent extended three inches up the rectum. The edges were properly vivified, and closed by leaden sutures.

Prof. W. E. Horner (Am. Journal Med. Sciences, vol. xx, p. 329, 1850) furnished the history of a severe case of laceration, attended with such loss of tissue as to induce him to undertake the relief of the patient by raising two flaps from the contiguous parts, and, turning them on their bases, united them across the chasm. This case, as related by Dr. Smith, although not cured entirely of incontinence, was much benefited.

Prof. Gross (Gross's Surgery, vol. ii, p. 1051) treats of the subject, agreeing in the main with the plan of Baker Brown,

except in the particular of dividing the sphincter, which, he says, he has never found necessary to do.

### Time for Operation.

The operation is divided into *primary* and *secondary*. By the term *primary* is meant the employment of the suture at a period when the surfaces are raw from laceration. By the term *secondary*, at any period when the knife is required to freshen the margins of the laceration. If the case is one demanding sutures, the sooner they are inserted the better. If called at a period when, in consequence of the extreme distension, the parts are œdematous, contused, and threatening gangrene, it is thought best by many to avoid the suture. If, however, the metallic thread is used, I do not see any objection to its application, even under such unfavorable local conditions. Should only a few points of adhesion be secured, it is a positive gain. Those who object to primary or immediate operations allege, *first*, there is danger of vaginitis or metritis; *second*, the lochial discharges diffusing themselves over the parts prevent healing; and *third*, cases make a good recovery when a proper position is maintained and the process left to nature.

With regard to the first the dangers apprehended are for the most part imaginary. If the metallic thread be used, there is really less irritation and suffering than if left untouched, because the exposed raw surface is almost completely closed. And for the same reason the second objection is answered, inasmuch as an accurate adjustment precludes in a good degree any prejudicial effects from the lochial flow. The last objection rests on a peradventure, and puts the exception before the rule. Nature, unaided, in the large majority of cases, makes but a sorry restoration of the perineum. The retraction which the muscles undergo before and during the slow progress of granulation and cicatrization, diminishes very much the proper execution of their functions; and hence the value of immediately introducing the suture.

When the *primary period* has passed, and the *secondary operation* becomes necessary, the question arises, when should it be done? In general we say, whenever the patient's general health is well established and the parts thoroughly healed, sound and free from all inflammatory and suppurative action. It is imperative that such should be the case, otherwise the tissues will not sustain the pressure of the suture. This will demand ordinarily two or three months, but if it even should require a year or more, it must not be disregarded.

Is it impossible to undertake an operation during gestation? Such, until recently, has been the opinion of most surgeons. They have supposed that, during this period, the attractive forces concentrated upon the uterus and its associate organs would defeat the healing process in the perineum. This view is not sustained by facts. The cure may therefore be undertaken during the early months of pregnancy; that is to say, antecedent to the fourth month. Such is the opinion and counsel of Baker Brown, who says, in no instance in which he has operated, have there arisen any symptoms threatening miscarriage.

Beyond this period there are two reasons rendering it improper to undertake an operation. First, the reflex influence, inviting uterine contractions and endangering the safety of the embryo; and second, the time is too short to secure to the perineal components the requisite physical and vital properties of elasticity and contractility, so as to run no risk of a second laceration.

The menstrual flow constitutes another contraindicating circumstance. The third or fourth day after its cessation is the favorable period. The presence of a catarrhal attack, accompanied with cough or sneezing, is of sufficient importance to defer any operative measures, as the antagonism which exists between the diaphragm and perineum would be the means of greatly disturbing the dressings. There are some, among whom may be named Roux, who oppose operation while the mother is nursing. The same counsel is given in cases of vesico-vaginal fistula, under a belief that there is great danger of subsequent pyæmia. I have not regarded

this caution in cases which have come under my own care, and in no instance have I seen any unpleasant results.

### Preparation of the Patient.

Whenever the surgeon assumes the management of such a case, the condition of the different organs should be carefully inquired into. He will often find such patients suffering from diarrhœa, disturbance of the digestive organs, and a train of distressing nervous symptoms. To correct these, a properly regulated diet, fresh air, the subnitrate of bismuth, together with tonics, either vegetable or mineral, are necessary.

The medical attendant should discountenance the habit of taking laudanum, opium, or other narcotics, in order to keep the bowels costive. A patient cannot continue to do so long with impunity. The digestion will be, sooner or later, impaired. It is much better to secure consistent stools by a careful study of the food. An animal diet, with stale bread, boiled milk, and a very moderate allowance (if any) of vegetables, will usually effect this result. Thirty-six hours before the operation the bowels should be emptied by a gentle cathartic, such as castor oil, after which a sufficient amount of opium should be administered to render them quiet. The hair is to be removed from the parts, and a very moderate amount of food taken the morning of the day appointed for the operation, so as in no way to interfere with the anæsthetic.

The bed on which the patient is to lie should be a firm mattress, protected by a piece of oil-cloth, over which may be spread a folded sheet.

### Operation.

*Assistants.*—To have every appointment consummated in the most satisfactory manner, there should be not less than four assistants, although three will answer; one to take charge of the anæsthetic, one to support either lower extremity, and one to attend to the sponges and instruments which may be required by the surgeon.

*Position.*—Three positions have been advised.

First. *On the side*, with the nates brought over the edge of the bed and the thighs strongly flexed on the body. This is the position recommended by Busch and Moser, and they claim for it complete relaxation of the perineal tissues and less risk of cold, as there is very little of the person unprotected by clothing.

Second. The *kneeling posture*, the body well bent forward.

Third. The *dorsal position*, the patient resting on the back, the hips projecting over the side of the bed; the legs flexed on the thighs, and the thighs on the abdomen: this is the lithotomy position.

Fig. 5.

Fig. 3.

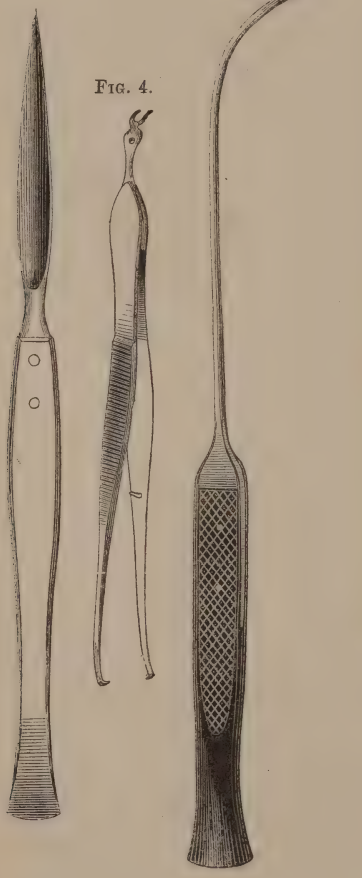


Fig. 4.

The one preferred by most operators, and which is unquestionably superior to all others, is the third. It offers in every respect the best control of the parts.

*Instruments.* The instruments required are few and simple. An ordinary scalpel (Fig. 3); a pair of long-bladed forceps, with an adjuster at one extremity (Fig. 4); three or four good-sized needles to insert the more superficial or secondary interrupted sutures; a needle supported on a handle (Fig. 5, Fig. 7), to introduce the deep or primary sutures; silver wire, perforated shot, shot compressor (Fig. 6), scissors, tenaculum, silk ligatures, and sponges. Such comprise

the list of instruments required for the execution of the operation. Should the method of Baker Brown be preferred, there will be wanted a blunt or probe-pointed bistoury to divide the sphincter, and pieces of cane or elastic bougie, together with waxed twine, to form the quilled suture.

FIG. 6.

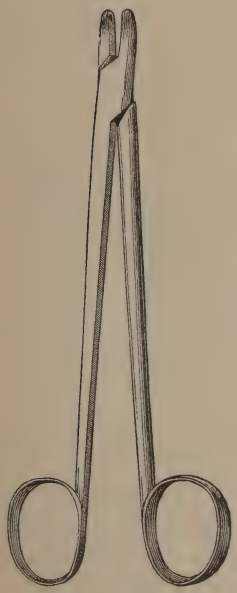


FIG. 7.

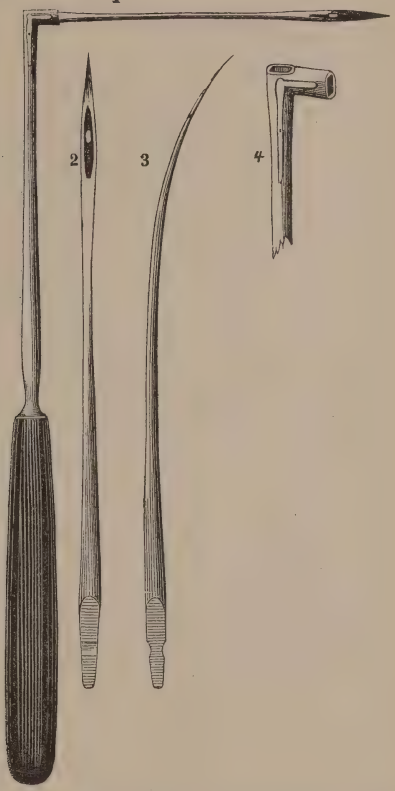



FIG. 7.—1. Needle for introducing the deep sutures. This I have had modified, making it a more useful instrument. It consists of two parts, the holder and the needle. 2 and 3 give two views of the needle. The lower extremity is square, with a notch, designed to fit into the shank 4, either at its extremity, so as to be in a line with the handle, or at a right angle, and secured by a spring which sinks into the notch.

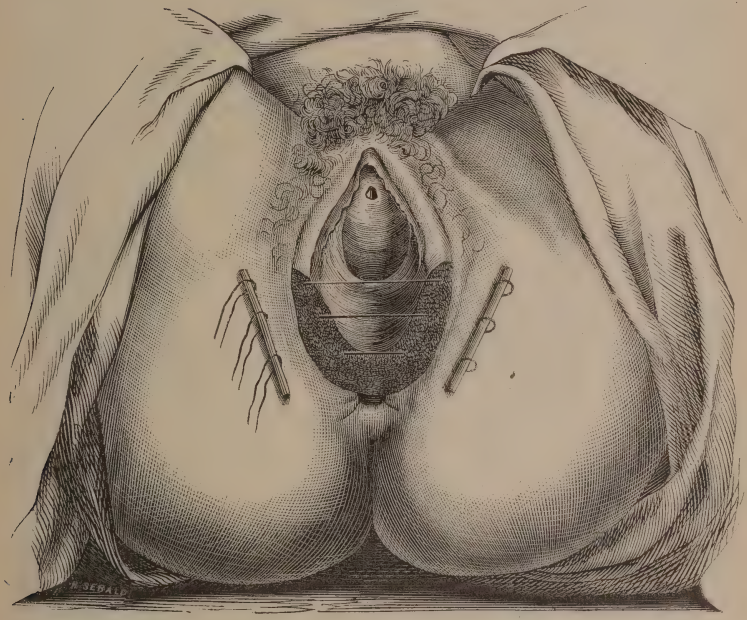
*Immediate or Primary Operation.*—If the accident is discovered immediately after its occurrence, it should be promptly treated with the suture within twelve hours. Simple ap-

proximation by position is not reliable. The number of sutures will be determined by the extent of the laceration. The advantages of such a course will be apparent, when it is considered the perineal tissues are flaccid in consequence of the extreme extension to which they have been subjected, and, therefore, there will be little strain on the threads. Again there is an innate tendency in the parts to heal when thus immediately adjusted. The mode of using the suture will be explained under the head of the secondary operation. The parts must be kept perfectly clean, being frequently bathed with a solution of the permanganate of potash, and all the subsequent treatment carried out in the manner described hereafter.

*Secondary Operation—The Method of I. Baker Brown.*—The woman being placed in the lithotomy position, and the parts carefully shaven, an assistant gives the requisite tension to the sides of the laceration, while the surgeon pares away the parts half an inch external to their edges, and sufficiently deep to reflect inwards the mucous membrane. The recto-vaginal septum must also be carefully freshened. The next step consists in dividing the sphincter ani on both sides about a quarter of an inch in front of its coccygeal attachment. This is done by a blunt-pointed bistoury, conducted by the finger within the margin of the anus, and then pressed through the tissues to the extent of one or two inches external to the anal opening, and through the more superficial fasciculi of the muscle, leaving the deeper portion undisturbed. The third stage comprises the insertion of the sutures. For this purpose a strong needle, armed with a double thread, is passed through one side, entering one inch external to the edge and coming out at the termination of the denuded surface, after which it is made to traverse the opposite side, entering and emerging at points corresponding to the first. Each suture is to be inserted in the same manner, the one nearest the anus always first. The needles used for this purpose, I presume, are such as are figured in Dr. Brown's book, and a representation of one of which is seen in Fig. 5.

The threads thus passed present loops on one side and free ends on the other. Two pieces of cane, or elastic bougie, are next placed in position, one piece passed through the loops, and the other laid between the free ends, and both parallel with the wound. The approximation is effected by pressing the sides of the laceration together and tying the free ends securely around the cylinder which lies between them.

Fig. 8.

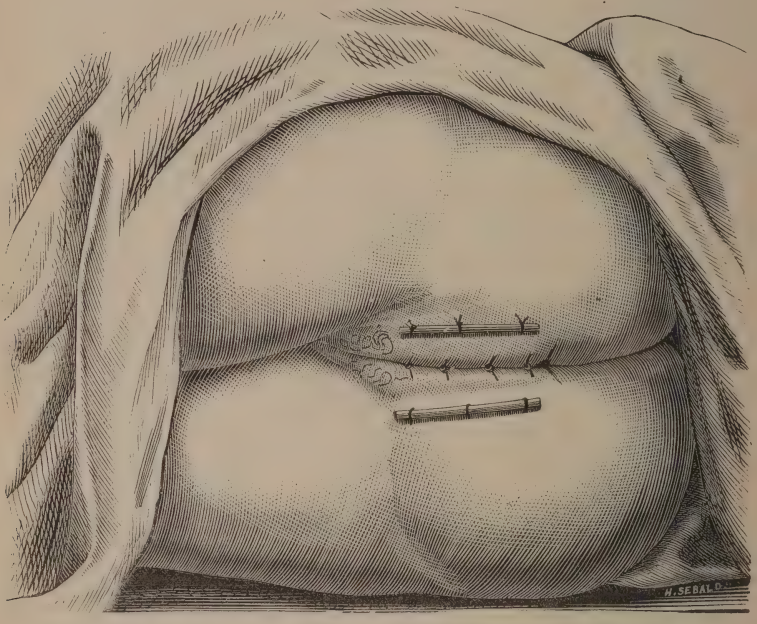


Introduced from I. Baker Brown's book, with a view to exhibit the pared edges, the quilled sutures in position, and sphincter divided on each side.

To prevent eversion of the edges, a result of the quilled suture, interrupted metallic sutures are inserted between the others. Langenbeck and Verhæghe employ for this purpose the twisted or hare-lip suture. Before closing the operation one finger should be carried into the vagina and another into the rectum, in order to ascertain the accuracy of the adjustment. The parts are next cleansed; a piece of lint, wet with cold water, laid over the parts; upon this a

folded napkin; the whole secured by a T bandage. The urine is to be drawn every four or six hours for four or five days, or an elastic catheter may be placed in the bladder and allowed to remain for twelve or fourteen hours, the free end being placed in a liquid-proof bag to receive the urine. One grain of opium is immediately given, and repeated every six hours for the first twenty-four; afterwards one grain night and morning. Fig. 9 exhibits the parts closed.

Fig. 9.



The diet is to consist of milk, arrow-root, beef tea, mutton chops, and, if required, port wine.

Forty-two hours after the operation the deep sutures should be removed, and the superficial ones about the seventh day.

The opium is to be continued, so as to keep the bowels constipated for two or three weeks after the parts have united, after which they may be moved with castor oil and enemata of warm water.

In this method of Baker Brown it will be found, on re-

viewing the historical part of our article, there is nothing new. The quilled suture had been used over thirty years ago by Roux, Davidson, and others. Incisions of the skin and subcutaneous tissues had been inaugurated by Dieffenbach; of the sphincter muscle by Saucerotte; and the use of opium to constipate the bowels had been taught by Dieffenbach and others. The particular point and direction at which the sphincter is divided belongs, however, to Baker Brown; and not only so, but by combining all these peculiarities into a method, and illustrating their value by a record of cases greater than any other man, he has done a great work for surgery, and gained a strong hold over the mind of the American profession.

*Agnew's Operation.*—In every operation our aim should be to render it as simple as may be consistent with efficiency; and therefore the question comes up, can any part of the Brown method be omitted without diminishing the value of the operation? In support of the affirmative, I submit the plan pursued by myself, and illustrated by a sufficient number of cases to give it some claim to public confidence.

*Preparatory Treatment.*—This is pursued in accordance with that already laid down, except in the matter of opening the bowels with a gentle cathartic, which I prefer being given two days rather than one before the operation, and followed by one grain of opium, so that everything shall be quiet when the period comes round.

*Position.*—The position on the back, or the lithotomy position, is the one always preferred. The hips should be brought over the edge of the bed, and the limbs, flexed, should be supported by an assistant on either side.

*Operation.*—The operator takes his position, either sitting or kneeling, in front of the perineum, and seizing one side of the laceration, commences the denudation from behind forward, including a little of the labium. In breadth it should extend inward, so as to include a little of the vaginal mucous membrane, and outward towards the buttock. The paring should not extend deep, and, when completed, should

be one inch broad. The opposite side is to be treated in the same manner, the raw surfaces in form and extent being as near alike as possible; next, let the assistants supporting the limbs, take hold of the parts on either side, and make the recto-vaginal septum tense, in which condition its surface can be freshened, without difficulty, to the extent of three-quarters of an inch. Let every attention be given to ascertain no portion escapes the knife. The bleeding is usually free, but it will be seldom necessary to apply a ligature. Should it not cease under the application of ice-water, a stream from the nozzle of a syringe, applied steadily for some time, will rarely fail. Should both fail, introduce the sutures, and rely on the adjustment.

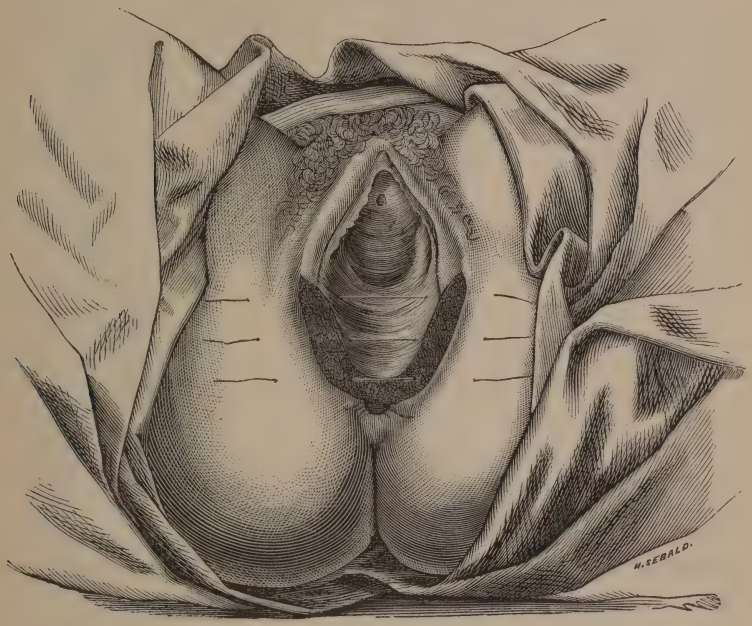
*Sutures, and their Introduction.*—The approximation is to be effected by the interrupted suture—one series termed the *deep*, and the other the *superficial*—the materials composing the thread being silver wire. The deep ones are to be first introduced, commencing with the posterior or one next to the rectum. Three or four of these will generally suffice, even in extensive cases. The superficial ones are to be inserted intermediate to the others.

The needle, being threaded, is made to penetrate one side, entering one inch exterior to the denuded border, and coming out on the mucous membrane of the vagina. It is then unthreaded, and the needle withdrawn, and the same end of the wire again passed through its eye, when it is made to penetrate the opposite side at points corresponding with the first. After this manner the other deep sutures are to be inserted. (See Fig. 10.)

*Adjustment.*—The blood being carefully sponged away, the nates are to be pressed toward each other by the assistants, and the ends of the suture first introduced (the one nearest to the anus) are to be passed through the hole in the adjuster, at the end of the forceps, and being strongly drawn upon as the latter is carried down, the parts are brought together with great accuracy. To maintain and secure the approximation, a perforated shot is next run down over the wires, and firmly clamped between the jaws of the compressor.

After the treatment of the other sutures in a similar manner, the operator proceeds to deposit the superficial threads. These must be placed between the others, to effect which a good-sized curved needle, armed with a silver wire, is entered three-eighths of an inch from the edge, on one side,

Fig. 10.




Represents the parts freshened and the sutures inserted, ready for the approximation.

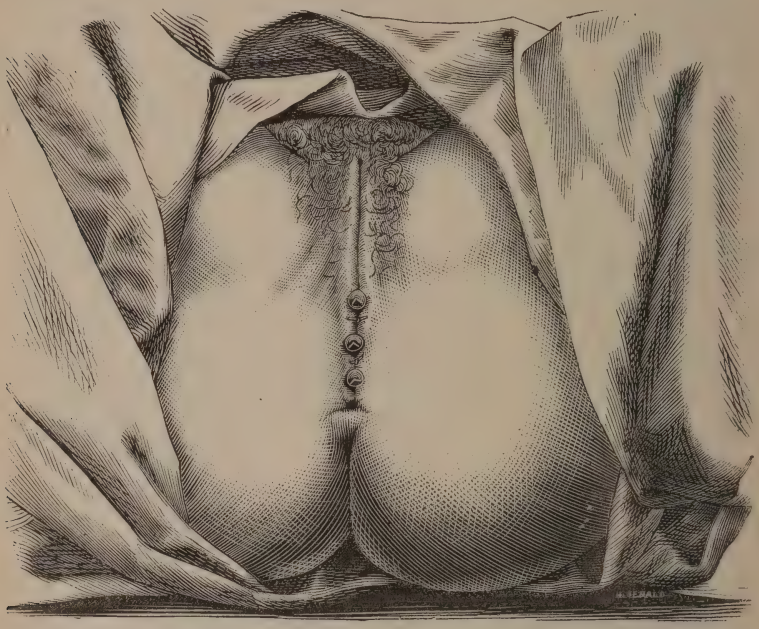
made to penetrate the skin and some little into the cellular tissue, and emerge an equal distance from the edge on the opposite side. These may be secured by twisting the ends about each other. This done, the sutures are to be cut off—the superficial ones at the twist, and the deep ones on a level with the shot.

The appearance presented by the parts when thus adjusted, is well seen in Fig. 11.

A strip of adhesive plaster, two and a half inches wide and twelve or fourteen inches long, may now be placed across the nates, to give additional support, and the woman put to bed,

with the knees bound together with a roller, taking care to interpose a napkin between, to prevent excoriation. The position to be maintained is either on the back, or the side, the patient not being rigidly confined to either.

Fig. 11.



*After-treatment.*—As a matter of primary importance the bowels are to be kept quiet, and to this end, opium must be administered in sufficient quantities to effect the object. Half a grain three or four times a day will usually answer. The urine must also be drawn at intervals of five or six hours. Should the nurse not be able to use the instrument—a matter I always insist upon—and the patient be at such a distance as to render it inconvenient for the surgeon to make frequent visits, then, a self-retaining catheter with a piece of gum tubing attached may be worn, and the end passed into a vessel. After four or five days the patient may turn carefully over upon her breast and pass the urine into a bed-pan, dispensing altogether with the use of the catheter.

*Diet.*—This should consist of milk, beef essence, soft-boiled eggs, meat once a day, tea, coffee, and wine.

*Removal of Sutures.*—On the third day, or seventy-two hours after the operation, the deep sutures should be removed, commencing with the anterior one and proceeding back, the reverse of their introduction. In accomplishing this, the wire is cut on one side of the shot, then the curve or hook at its end straightened, to prevent scratching, and finally, the loop drawn away by pulling on the shot while pressure is being made against the thread so as not allow its cutting into the flesh. Should the suture next the rectum be found well in place, and no cutting or ulceration, it may be permitted to remain another day.

Baker Brown recommends the removal of the deep sutures forty-two hours after their insertion. If at that period they begin to loosen by ulceration, it should be done. The superficial sutures should not be disturbed for four days longer.

On the second or third day the hips of the patient—lying on the side—are to be brought over the edge of the bed—a piece of oil- or rubber-cloth being interposed—so as to reach into some vessel, and then a stream of tepid water, containing a solution of the permanganate of potash, thrown upon the parts with a syringe. The effect of this is always very grateful to the patient, and exercises a good influence over the healing process. This is to be repeated every day. On the twelfth day the bowels may be opened. This is to be accomplished with the greatest care. A teaspoonful of oil should be given every five or six hours, and when the feelings of the patient indicate the near approach of a stool, then let an enema of soap and water be thrown up the bowel, charging her to refrain as much as possible from all straining or expulsive efforts. After this, they should again be locked up for six or seven days, to permit the more secure consolidation of the parts, and it may be well for a few days to observe the caution of having the evacuations in the recumbent position. If everything has progressed favorably, the patient may be allowed to sit up after the sixteenth or seventeenth day.

In cases where the recto-vaginal septum is torn to any con-

siderable extent it will be necessary to modify the operation. The borders of the chasm must be well freshened, and brought together by silver threads, passed transversely by means of short, slightly curved needles, and secured by the shot clamp, the ends being cut off close to the same. This completed, the restoration of the perineum may be next executed. In the first case of this nature which came under my care, two operations were done at an interval of four weeks, the first to close the septum between the two canals, and the second to restore the perineum. There is no necessity for this delay; they should be done at a single operation.

*Report of Cases treated by the Interrupted Silver Suture alone, and without division of the Sphincter Ani.*

Case I.—Mrs. ——, æt. 22, from Kentucky, during her first labor had the perineum torn, not only dividing the sphincter ani, but extending up the vagino-rectal septum over half an inch. Her parturition was difficult and prolonged, extending over thirty-six hours, and requiring instrumental delivery. Two operations had been performed for her relief without success before her arrival. She was a lady of delicate organization, with not much muscular tone, and her health not well established when arriving in the city. Her disability was of such a character as to render her incapable of exercising control over either flatus or fæces. At the request of Dr. Wilson, under whose care she had been placed for professional aid, I was asked to examine the case, with a view to determine what could be done for her relief. It was concluded that a short time should be employed in improving, as far as possible, the health of the patient by appropriate diet and mineral tonics, after which, an operation should be done to close up the vagino-rectal septum, and afterwards, a second, to reconstruct the perineum. After the lapse of two weeks, it was deemed proper to proceed with the operation. The day previous the bowels were opened, after which an opiate was administered. The patient being etherized was placed on her back, the hips being

brought to the edge of the bed, and the limbs, flexed, given to assistants, one on either side. A Sims speculum was next introduced into the vagina, drawn toward its anterior wall, and intrusted to one of the assistants supporting the limbs. The edges of the vagino-rectal septum were now seized with a pair of long, rat-toothed forceps, and freshened, each in its entire length, making the raw surface as extensive as possible. The hemorrhage was trifling. Five silver threads were next inserted transversely, introducing the upper one first, and twisting together the ends of each suture, to prevent the different threads from becoming entangled. Next followed the adjustment, by passing successively the ends of each wire through the adjuster at the extremity of the forceps, and drawing on them as the latter was pressed down on the wound. The set thus given to the wire sufficed temporarily to retain the edges in close proximity, and then, to secure permanently the approximation, a perforated shot was run down over each thread and clamped by being compressed between the blades of the compressor. The wires were next cut off close to the shot, and the patient placed in bed upon her back. The urine was removed, morning and evening from the bladder, and the bowels kept quiet by the exhibition of half a grain of opium, twice daily; the diet to consist of cream toast, eggs, tea, with arrow-root, and animal food once a day. On the eighth day following the operation the parts were examined, and the stitches removed, when union was found to be complete. The patient was replaced in bed, and, after three days, the bowels opened, by administering one teaspoonful of ol ricini every six hours.

The next step was to restore the perineum. Four weeks were allowed to elapse, that the patient might recover from the confinement and effects of the first operation, after which the same preparatory measures were adopted as at the first. She was again etherized and placed in the usual position on the back, with the limbs flexed on the body, and controlled by assistants. The vaginal surface of the vagino-rectal septum was freshened for a little distance up, after which the knife

was made to transfix the tissues on one side of the perineal rent, paring away a broad surface from below upward. The opposite side was subjected to a similar treatment, and as soon as the bleeding ceased, four long, curved needles, each bearing a silver thread, were deposited across the wound, the lower one first, and each made to enter and come out one inch from its margins, so as to include a large amount of tissue. These were secured as in the first operation, and the subsequent treatment conducted in the same manner. A portion of the sutures were removed on the fourth day, and the remaining ones on the seventh, the union being complete.

Case II.—Mrs. ——, aged 23, from Pennsylvania, fell in labor with her first child. Last stage protracted, demanding the use of the forceps. The perineum gave way, the rent passing through the perineal centre, and severing the two segments of the sphincter ani and constrictor vaginæ muscle. The accident entailed incontinence of the fæces, rendering her exceedingly miserable. Eight weeks after, I was invited by Dr. E. Wilson to visit this lady and see what could be done in her case. An examination satisfied us as to the curability of the distressing accident. The following week the operation was performed. The patient being brought under the influence of ether, was placed on her back before a good light, at the side of the bed, the hips resting on its edge, and the limbs flexed on the body and sustained, each, by an assistant. The sides of the laceration were next pared by transfixing with a sharp-pointed bistoury at their posterior extremities, and cutting forward, including to some extent the base of each labium; the denuded surface being one inch in breadth. The sides of the recto-vaginal septum were now carefully freshened for a little distance. The bleeding having ceased, two silver sutures were first placed across the vagino-rectal chasm, and its sides brought together and secured by pellets of shot; this restored the septum. To effect the approximation and union of the sides of the perineum, four stout needles, two and a half inches long, and moderately curved, threaded

with silver wire, were carried first through one side from without in, and then through the other from within out; the one next the anus first, and all deeply inserted, entering and coming out one inch beyond the denuded surfaces. The parts were now readily brought in contact by sliding the adjuster down over the wires while they were drawn upon, and then securing the retention by the shot-clamp, as previously described, cutting each suture off close to the leaden pellets. The patient was then placed in bed, an opiate administered consisting of opium one grain, a nutritious diet of animal broths directed, the urine removed from the bladder twice daily by the catheter, and the bowels kept closed by the exhibition of half a grain of opium morning and evening. On the seventh day following the operation, the stitches were removed, the union being well established. This lady has never complained of any inability to control perfectly the alvine discharges. She has likewise given birth to a child without any lesion of the cicatrix.

Case III.—Mrs. Y., 39 years of age, residing a few miles from the city, married late in life. She became pregnant and fell in labor at full term. The structures of the perineum were rigid and unyielding, and the fœtal head was for several hours engaged at the inferior strait, the delay not being due to any malposition or disproportion between the head and pelvis, but from the obstinate resistance of the soft parts. Proper measures had been employed to overcome this source of difficulty by her physician, a very intelligent and competent gentleman; and notwithstanding support was applied to the perineum, as the head emerged, a slit occurred, passing from the posterior commissure of the vulva to the anus, and extending in depth through the perineal centre, separating the muscles concentrating at this point. The accident involved incontinence of the fæces, unless stools were very consistent. Three months were allowed to elapse in order to give the parts time to recover completely from the injury, and the general health of the woman to be well established. At the expiration of this time I performed the

operation for her cure, assisted by Drs. Read, H. Corson, and Townsend. The details of this case differed very little from those already described. The patient was etherized, placed on her back, and the hips brought down to the edge of the bed, the limbs being properly supported. A broad surface, three-fourths of an inch in width, was pared away from either side of the fissure, and the recto-vaginal septum denuded for half an inch on the vaginal surface, by supporting it over the finger, introduced into the rectum while the knife was being carefully applied. Four silver threads were next deposited across the wound (observing to insert the lower one first), adjusted and clamped with shot, with intermediate ones of less depth, and the subsequent treatment, as to catheterism, opiates, and diet, conducted on the same plan as already indicated in previous cases. Seven days after, the sutures were all removed, and the union found complete. The patient was kept in bed for five days longer, the bowels being opened by the exhibition of small doses of castor oil, at intervals of five or six hours. The function of the bowel was completely restored. The deep sutures should have been removed three days earlier, but the delay was occasioned by my absence.

Case IV.—M. A., an Irish woman, aged 24 years, was admitted into the Pennsylvania Hospital by Dr. Hunt. Her first labor, she stated, had been difficult and prolonged, although she had received no intimation of there being anything unusual in either the presentation or position. An intense pain expelled the head quite suddenly and unexpectedly at last, the perineum being without support, and produced a laceration, which extended through the sphincters into the bowel, entailing incontinence of the rectum. The mucous membrane of the intestine was considerably prolapsed, forming a red tumor at the outlet of the anus. Three months after the accident had elapsed, her health being good, the operation was performed by Dr. Hunt, assisted by Drs. Morton and Agnew, and in the presence of the resident physicians of the Institution. The edges being

well pared, were united by four silver threads, deeply inserted and maintained securely in position by the shot-clamp, the intermediate ones being less deeply placed, and their ends twisted together. The treatment was similar to that adopted in the cases already detailed. All the sutures were removed by the eighth day, and the parts found accurately closed. This woman was discharged without any defect in the function of the bowel.

Case V.—Mrs. ——, æt. 25 years, during her second labor, which was tedious, though in no way complicated by an unusual position of the cephalic presentation, had the perineum torn, but not to such a degree as to render her incapable of fæcal control, except when the discharges were lacking in consistence. Two years after she gave birth to a third child, in which act the laceration was greatly extended, quite one inch up the bowel, and rendering her utterly powerless to restrain either flatus or alvine discharges. Imagining her case hopeless, and being exceedingly retiring and sensitive, she became greatly depressed, and for six years was obliged to live secluded from society. At the suggestion of a medical relative, she was prevailed upon to allow me to examine her case, when an operation was agreed on. It is unnecessary to repeat the formalities of the etherization, position, &c. The parts being properly exposed by the Sims speculum, the margins of the recto-vaginal fissure were freshened on the vaginal side, and afterward those of the perineum. Six silver threads were passed through the sides of the first, the upper one taking precedence, and the closure effected by the shot-clamp. Four sutures were next inserted through the sides of the perineal rent, and these brought in accurate contact by the adjuster and shot. The catheter was employed morning and evening to relieve the bladder; the bowels kept quiet by McMunn's elixir of opium, and a nutritious liquid diet directed, with a glass or two of wine daily. The sutures were all taken out by the seventh day, the parts having united well. This lady, not long since, was delivered of a child without any accident to the perineum.

Case VI.—Mrs. ——, aged 24 years, residing some distance from Philadelphia, fell in labor with her first child. There was nothing unusual in the position of the fœtal head, but its progress was very slow, and finally demanded the use of the forceps. While being adjusted, a violent pain came on with great suddenness, expelling head and instruments together, dividing the perineum and involving the recto-vaginal septum. The child did not survive. She asserts with great positiveness the wound was inflicted by the blade of the forceps.

The consequences entailed were unusually distressing, not only affecting the function of the bowel, but producing such displacement of the pelvic viscera as to disqualify her from taking exercise on foot, and affecting her general health and spirits. At the suggestion of Dr. Shultz, whose patient she afterwards became, I was consulted, and, after examination, advised an operation. This was subsequently performed in the usual manner, and the after-treatment skilfully conducted by the Doctor. The only thing worthy of note was the giving way of the middle-deep suture, and which most likely was due to some defect in the wire. This part, however, healed up by granulation, being occasionally stimulated with the sulphate of copper, and although the progress was slow, yet the result was perfectly satisfactory, both in regard to the retentive power of the bowel and the capacity to take exercise.

Case VII.—Mrs. ——, æt. 23 years, in a first labor; head presentation, delivery by forceps; had the perineum lacerated, extending into the bowel. Dr. Hunt was called to see the case, by Dr. Reid, and after examination recommended an operation. The retentive function of the bowel was in a great measure destroyed, and her condition necessarily very uncomfortable. On the day of the operation I was invited by Dr. Hunt (by whose consent this case is reported) to aid him in its performance. After etherization the parts were extensively denuded and then brought together by four deep

and three superficial interrupted sutures, the former secured with the shot-clamp and the latter by the twist.

The after-treatment was judiciously conducted by Dr. Reid on the plan described in former cases. On the seventh day the sutures were removed and union found complete. Four days after, the bowels were opened carefully, and at the expiration of eight days more the woman was sitting up. I have heard frequently since from this lady, and am assured her restoration is perfect.

Case VIII.—Mrs. ——, æt. 24, in a first labor, with a head presentation, delivered of a dead child with the forceps; received an extensive injury of the perineum. She does not think there was anything peculiar in the position of the presenting part, having heard nothing from her physician to that effect. The terminating stage of her labor, she states, was unusually long and severe, the head resting several hours on the distended perineum. The laceration passed through the perineal centre and three-quarters of an inch up the recto-vaginal septum. Her condition she believed to be irremediable. After the birth of a second child she passed into the care of my friend, Dr. Spooner, a skilful obstetrician and at his suggestion, consented to an operation. At the date of its performance her child was four months old and nursing at the breast. She had no control whatever over the intestinal contents, and her situation was peculiarly distressing.

Aided by Drs. Spooner, Andrews, and Sherk, I executed my usual operation. The only event worthy of notice during the progress of the case was the accumulation of a large mass of hardened fæces in the lower bowel, which, on the ninth day, was expelled with great difficulty, remaining for some time in the anus, which was excessively distended, and tearing open the cicatrix for a little distance forward from the verge of the bowel. An experienced nurse could have prevented this occurrence by an early recognition of the trouble and the employment of injections. An examination, however, revealed the fact that the separation extended simply

into the fascia, while the deep portion remained uninjured. The chasm rapidly granulated up, and the cure proved successful beyond our expectations.

Case IX.—Mrs. ——, aged 30, in a tedious labor, eighteen years ago, the particulars of which I am unable to learn, received a perineal rupture, extending to, but not through the muscular centre. While the ability to control the intestinal contents was not lost, yet the support to the pelvic viscera being diminished, it was followed by displacement of the uterus and a train of distressing nervous symptoms. The employment of mechanical appliances to correct the malposition of the womb was frustrated from the want of a proper base of support. An operation to restore the perineum was suggested by her physician, Dr. Ellwood Wilson. The operation was shortly after executed, assisted by Drs. Wilson, J. Forsyth Meigs, and W. Pepper, Jr. Nothing unusual took place in the subsequent conduct of the case, and the result proved a complete success. The effect on the general health of the patient justifies us in stating that exercise on foot could be taken with comparative comfort, although her nervous condition was not materially benefited. The time, however (three months), which has elapsed since the recovery, is too short to determine what results may accrue.

Case X.—E. M——, aged 52 years, admitted into the Pennsylvania Hospital suffering from complete procidentia of the uterus. Fig. 12, from a sketch taken at the time by Dr. George Pepper, represents with great faithfulness the appearance presented at the period of the operation. She states that 20 years previous she had given birth to twins. The labor was tedious, but no instruments were used. She thinks it was at this time the perineum was torn. Five years after, she was delivered of another child, and the rent increased; shortly after which the uterine displacement came on, becoming gradually worse, until almost disqualified for work, she sought medical advice. Believing that the

restoration of the continuity of the perineum would offer an obstacle to the escape of the uterus, Dr. Hunt performed

Fig. 12.

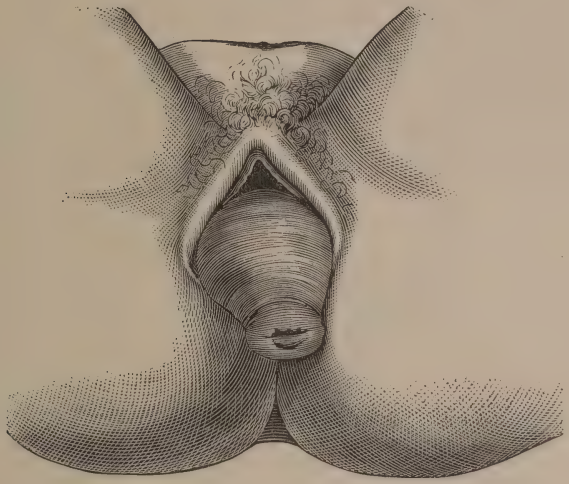
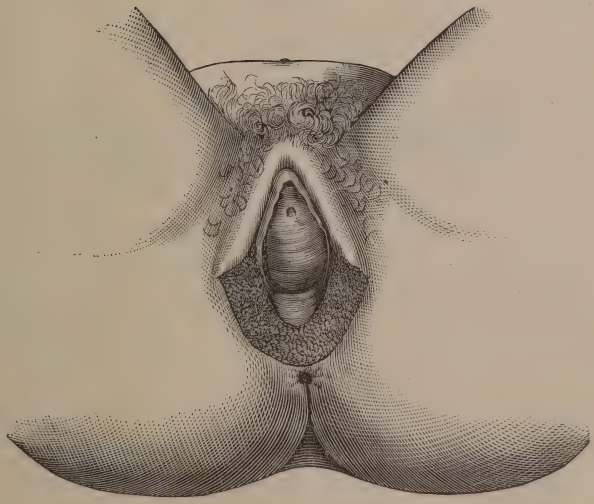


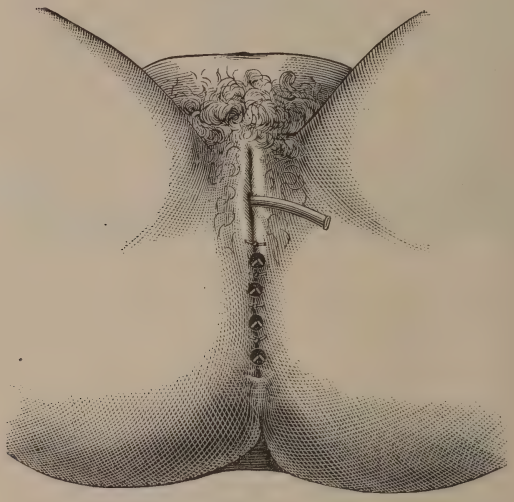
Fig. 13.



the operation, assisted by Drs. Morton and Agnew, and in the presence of the Hospital residents. The patient being

previously etherized and placed on the back, the limbs supported in the usual manner, the margins were extensively denuded, as shown in Fig. 13. Three deep silver sutures were inserted and secured by clamps of shot, and intermediate to these, two superficial sutures, fastened by twisting the ends about each other. A broad piece of adhesive plaster was next drawn across the nates to relieve the sutures of tension, and an elastic catheter placed in the bladder for a time. Fig. 14 exhibits the operation completed.

Fig. 14.



The drawings from which these cuts were taken were executed by the skilful pencil of Dr. George Pepper.

On the fourth day the deep sutures were removed, and on the seventh the superficial ones, union being complete. A week later this woman was discharged from the Hospital perfectly well and free from all displacement.

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*Medical Times and Gazette*, August 30, 1856. Page 215. Treatment of Ruptured Perineum. By Dr. N. Wilson Varina.

*British Med. Journal*, August 17th, 1861. Page 171. Rupture of the Perineum during Labor. By Dr. Thomas Skinner. Liverpool.

*Guy's Hospital Reports*, 1865. Vol. ix. Page 270. On the Operation for the Relief of a Lacerated Perineum and Sphincter Ani, &c., with some of its Complications. By Thomas Bryant, Esq., Assistant Surgeon to Guy's Hospital.

*Lancet*, September 9, 1865. Page 289. Two Cases of Operation for the Cure of Laceration of the Perineum, under the care of James Lane, Esq., at St. Mary's Hospital.

ON THE

# MORPHOLOGICAL CHANGES OF THE BLOOD

IN

# MALARIAL FEVER:

## WITH REMARKS UPON TREATMENT.

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In the October number of the American Journal of the Medical Sciences for the year 1865, I published a short account of the pigment-matter found in the blood and in different tissues of the body, in cases of intermittent fever, as described by Prof. Frerichs in his work on diseases of the liver.* Up to that time I had been able to observe these appearances only in one case of intermittent, and in two of severe remittent fever. During the summer of 1865 we had in this country a greater prevalence of bilious fever than during many previous years. Localities which had been exempt for a long period became now again subject to it, and

* A Clinical Treatise on Diseases of the Liver. Dr. F. Th. Frerichs. Murchison's Translation. New Sydenham Society. London, 1860.

in its accustomed haunts it broke out with greater violence than usual. During my term of service in the Pennsylvania Hospital, in the months of August, September, and October, we had a large number of cases; some of which, from various points in the Southern States, and from along the Atlantic seaboard, exhibited a degree of severity, rivalling that of the Panama fever. We had cases from the Gulf of Mexico; from the North and South Carolina sea-coast; from Weldon, N. C., from various counties in Virginia, Maryland, and Delaware; and from the banks of the Appomattox, James, Potomac, Susquehanna, Delaware, and Schuylkill rivers. The total number of cases was one hundred and twenty-three; of different types and of different degrees of severity. Careful observations were made of all these, notes taken, the blood investigated microscopically in ninety instances during life, and full post-mortem examinations made in the six fatal cases. During my service in the corresponding months of 1866, I treated in the same wards fifty-three cases of autumnal fever; many of them very severe, but all ending in recovery. These were likewise closely observed, and the blood of twenty-five of the most decidedly ill patients repeatedly examined.

To present the results of these observations, with some remarks upon the treatment, is the object of this paper; and I cannot but hope that it will interest and inform those who will take the trouble to read it.

In the works of the older writers we find scattered notices of the discoloration of certain viscera observed in patients who had died of fever, but the pathological association of these conditions was imperfectly understood, and the appearances obscurely explained in connection with the prevailing "atrabiliary" theories. A few observers had indeed ventured more correct suggestions, but this view was accepted and reaffirmed at Berlin so late as 1829 (Vogel). Even Bright, who gives us an accurate description and faithful representation of a typical pigment brain, regarded it only as excessive vascular congestion in fever, and failed after "careful examination with the microscope" to ascertain

"the cause of the dark color of the cineritious matter, although the vessels were to be seen with unusual distinctness passing from the pia mater through the cineritious substance." This was also in 1829.* European authors of succeeding years recorded in their statements concerning the pathological anatomy of marsh fever, observations of a "black tinge" in the spleen and liver; but the alteration of color was first distinctly described by Dr. Stewardson, of Philadelphia, in a paper published in the number of the American Journal of Medical Sciences, for April, 1841.† His observations were carefully confirmed by extended observations of other American writers.‡ Meckel, in 1837, ascertained that the dark color of the organs depended upon an accumulation of pigment in the blood,§ and Virchow a little later discovered some additional facts; but the subject was first brought prominently before the profession by Dr. Frerichs. His observations were made in the city of Breslau, in Prussian Silesiă, during an epidemic of bilious fever which followed an overflow of the river Oder, in 1854. This pigment-material, as observed by myself, resembled exactly that which is described by Frerichs, a short *résumé* of whose description will be found in my article on the subject in the number of the American Journal of Medical Sciences already referred to. I should here mention also an interesting "note on the bronze liver of remittent fever" by Prof. Clark of New York, published in Dr. La Roche's work on yellow fever (vol. i, p. 610); and a paper by Dr. Joseph Jones of Augusta, Georgia, entitled "Observations on Malarial Fever," and to be found in the Southern Medical Journal of 1858 and 1859.

An idea of the appearances presented can be most readily formed by the reader from a full history of the several fatal cases.

* Reports of Medical Cases. Richard Bright. London, 1831, pl. xvii, case ci.

† Pract. of Med., Wood. Philadelphia, 1866, vol. i, p. 309.

‡ Amer. Journ. of Med. Sci., Jan. 1845. John A. Swett. Ib., April 1846. W. F. Anderson and Chas. Frick.

§ Cellular Pathology. Virchow, p. 257.

CASE I.—*Accumulation of Pigment in the Blood and Tissues. Pigment Brain. Coma. Death.*

Unknown man, aged about 70. Admitted Tuesday, October 3, 1865, 10 P.M. Taken ill upon a railroad train, and brought to the hospital in a state of absolute unconsciousness, from which he could not be aroused. No further history could be obtained, except that he came from a Southern malarial district and had been suffering from fever. Pulse 105, feeble; skin dry; extremities cold, head and trunk warm; respirations frequent, loudly stertorous, jerky. Pupils very much contracted, uniform and symmetrical, not responding to light. No apparent paralysis of extremities, but fæces frequently and involuntarily voided. Dysphagia almost absolute.

Ordered: Hot bath, turpentine enema, blister to back of neck, one ounce of whiskey every hour.

October 4th, 11 A.M. Has remained unconscious. Swallowed a portion of the whiskey. Skin warm throughout, and moist. Pulse fuller, less frequent (92), very compressible. Pupils contracted ad minimum. Breathing as yesterday; tubes filled with frothy mucus; mouth stained by bright yellow fluid now vomited from the stomach.

Ordered: ℞. Magnesiæ Sulph., ℥ss.; Olei Tiglii, gtt. ij; Aquæ, q. s.—M. Fiat haustus. ℞. Quiniæ Sulph., gr. xij; Spt. Frumenti, f℥j; Beef tea, f℥j.—M. S. q. h. per anum.

*Blood* (from finger). Red corpuscles dark, jelly-like, not crenated. Fine black pigment granules very abundant, free, and in cells presenting the appearance of white corpuscles. Rouleaux formed in masses. White cells increased in number, and large.

Died at 7.30 P.M.

*Autopsy, four hours after death.*—Body not emaciated.

*Brain.* Of chocolate-gray color. On its section-surface the delicate tortuous vessels appeared abnormally distinct, and the white substance was throughout of a dull, dirty-gray hue. No conspicuous congestion of vessels of convexity. Marked subarachnoid serous effusion over posterior superior part of convexity; also considerable fluid of the same

character at base of brain. Shreds of lymph around the pons and anterior surface of the cerebellum, and thickening of the membranes along the borders of Sylvian fissure. No apoplexy or ventricular effusion.

*Spinal cord.* Leaden-gray on section.

*Thorax.* Some pleuritic adhesions on left side. Very abundant pigmentary deposit in lungs; no tubercle; upper lobes crepitant throughout, but highly œdematous; lower lobes almost non-crepitant, but floated in water.

*Heart.* Fibre firm. Valves healthy, except small calcareous deposit on aortic surface of one semilunar valve; not sufficient to prevent its action.

*Abdomen. Stomach* much distended; slightly congested internally.

*Intestines* presented no glandular alteration; mucous membrane stained with bile. Mesenteric glands slightly enlarged. Numerous small points of pigment in the omentum.

*Liver.* Edge thin, extending one inch below sternum: dark olive-green on section. Gall-bladder moderately distended with dark bile, without calculi, and situated abnormally—to the right of the transverse fissure, in a depression of the under surface of the right lobe. *Pancreas* healthy. *Spleen* very much enlarged; at least five times the size and weight of the healthy organ. Peritoneal investment irregularly thickened and whitish. At the anterior part of its upper extremity a thin film of blood-clot, firm, and evidently formed for some hours at least. The pulp was dark, of greenish tinge, and softer than is natural.

*Kidneys.* Grayish-red, with dark points; firm; relative size of cortical and tubular portions normal. Cyst the size of a filbert-nut in the left, just beneath the peritoneum. Suprarenal capsules apparently healthy.

Blood, watery; depositing, on standing, black matter.

*Microscopic Appearances. Blood from Portal Vein.* Red corpuscles few, running together, no attempt at formation of rouleaux; darker than usual or very pale. White corpuscles much increased in number, varying in size, differently nucleated. Very many cells—similar to those of the splenic

pulp and to those observed in blood from the finger—sometimes larger than ordinary white corpuscles, containing a great quantity of black granular pigment. Abundant free pigment grains and granules, of various shape and size; usually intensely black.

*Blood from Vena Cava* (above junction of iliac, but below renal veins), on standing separated into serum and firm clot, pinkish above, dark below. The lower layer contained red corpuscles running together as though almost diffluent; an increased number of white corpuscles; a few cells containing pigment granules; and some free pigment, but the grains smaller and fewer than in the blood of hepatic veins. Blood at base of brain contained numerous pigment masses.

*Brain.* Capillaries of the white substance contained much granular pigment. Gray matter of a dark-chocolate color; capillaries everywhere filled with pigment granules; a few pigment masses in the tissue-substance proper.

*Spinal Cord.* A collection of pigment granules in all the capillaries.

*Spleen.* Pulp containing red blood corpuscles; connective tissue cells; many cells with granular pigment, and others without it; free black grains and granules throughout, in large quantity.

*Heart.* Muscular fibre healthy; capillaries containing pigment; large black masses and granules free in the tissue.

*Mesenteric Glands.* Firm, somewhat enlarged. Section-surface exhibited a dark ring near exterior of gland; seen, under a lens, to be due to abundant pigment entangled in the gland structure.

*Liver.* Cells with nuclei as in health; much pigment in masses and granules, adhering to the cells or existing within them, *i. e.*, in their "formed matter." In the blood of hepatic vein, pigment cells such as seen in portal vein and spleen.

The omentum was dotted with small black points of pigment entangled in the fibrous tissue.

*Kidney.* Malpighian tufts dotted with pigment. Free masses in the renal tissue. Epithelium healthy.

*Urine.* Acid. A few granular casts, vesical epithelium, and numerous spermatozoa. No albumen. No pigment.

Remarks.—I had never before seen a brain presenting such an appearance. It was leaden-colored throughout, as long ago described by Morgagni, who is quoted by Frerichs. The hue of the gray matter was most singular. It looked as though it had been washed over with a not very weak solution of India ink. I examined many specimens with the microscope. In every one of these, all of the capillaries were unusually distinct, and were crowded with black pigment in the form of granules, lying in their calibre or deposited apparently in the walls themselves. There existed also, scattered through the cortical brain-substance, isolated grains of pigment much too large to be embraced in a capillary tube. It was evident that the general dark color of the cerebral tissue and substance of the spinal cord was due to this aggregation of minute grains and granules. Wherever the blood had gone it had taken the pigment, filling the capillaries and lodging it in the tissues. To the naked eye, and more particularly to the eye aided by a pocket lens, the fine vessels of the white medullary matter were everywhere visible, resembling, as Dr. Bright aptly remarks, the "'' appearance produced by scraping the nap of fine cloth upon a sheet of white paper." The color of the liver was olive green, as stated in the notes. The term "bronzed liver," employed by Dr. Thomas Stewardson in his paper on Bilious Fever already referred to, most correctly expresses this appearance.* I was resident physician in the Hospital at the time Dr. Stewardson's observations were made, and I well recollect the appearances then seen. They were the same, as regards the liver, as those present in this instance. The case above described is strikingly similar to that detailed by Bright, and to those classified by Frerichs under the head of "cases with cerebral disturb-

* Dr. Jones thinks he has seen this bronze hue equally marked where the pigment granules did not exist, and Dr. Boling failed to observe the bronze hue itself.—*Am. Journ. Med. Sci.*, July, 1846.

ance." Not only were the post-mortem appearances of the blood and tissues entirely analogous, but, as in many of the instances cited, the patient first came under notice in a state of unconsciousness; the series of pathological conditions having ended (probably during a febrile paroxysm) in the *sudden* occurrence of convulsions, stupor, coma, and early death.* The probable extent to which the deposit of pigment in the brain is connected as a cause with these abnormal cerebral symptoms will be hereafter considered.

CASE II.—*Remittent fever. Pigment in all the tissues. Urine with albumen, granular casts, and pigment. Bronze Liver.*

Lewis Shellhorn, æt. 30; born in New Jersey; was brought to the Pennsylvania Hospital, September 26th, 1865, at 4 o'clock P.M., in a moribund condition. He was a sailor, and no history could be obtained beyond the fact that he arrived in Philadelphia, September 12th, 1865, from the coast of North Carolina; and that he had been taken sick on the trip up, at first with quotidian ague, but before reaching this port the regular chills had ceased, and the attack had assumed more the type of remittent fever.

*On admission.* Skin cool and sallow, shrivelled on extremities. Pulse barely perceptible. Respirations shallow and gasping. Unconscious, unable to speak; merely opening his eyes when spoken to very loudly. No urine passed. Belly retracted. No marked enlargement of either liver or spleen could be detected. Heart's action very feeble, but without murmur. Respiration weak; unaccompanied by any râle. It was impossible to get a full drop of blood from the fingers by pricking them, but the little which could be pressed out contained many white corpuscles; red corpuscles

* Sometimes severe brain symptoms, which speedily prove fatal, are developed after only a few hours of vague indisposition without any distinct febrile symptoms manifesting themselves. In other cases, a simple intermittent fever has existed for weeks or months, when suddenly a severe fit comes on, which often terminates fatally in an instant. Frerichs, vol. i, p. 332. Also Cases xxxii, xxxv, et al. This it will be observed is very different from the destruction of life by a paroxysm of "pernicious fever."

in diminished numbers, crenated and running together without forming rouleaux; and several black but small pigment grains. Deglutition was extremely difficult, but he was roused to swallow thirty-five grains of sulphate of quinia, and four fluid ounces of whiskey before his death, which occurred at 5.45 P. M., of the same day; one hour and three-quarters after admission.

*Autopsy, four hours after death.*—Spinal cord not examined.

*Brain.* Not much congested; cortex dark; white substance of a dull grayish color on section. No effusion into ventricles nor at base. Substance firm. Pigment granules were found in every portion of brain; in the gray matter of the convexity, in the white substance, in the olfactory bulbs, corpora albicantia, pons varolii, and gray and white matter of the cerebellum. There were a few large black masses found free, but by far the greater portion of the pigment was in the form of granules in the capillaries; at some places dotting their walls, at others collected into small plugs, filling the calibre of the vessel.

*Thorax. Lungs* nearly free from pleuritic adhesions; crepitant throughout; moderately congested in posterior inferior portions. No pleuritic effusion.

*Heart* healthy. No pericardial disease or effusion. Very small amount of blood in either tissues or larger vessels.

*Abdomen. Stomach* congested internally; its mucous membrane of a slate color. *Bowels* very much contracted, with no contents but about one drachm of dark fecal matter. There was no glandular lesion in either small or large intestine, Peyer's patches being merely slightly congested.

*Spleen.* About double the natural size, less consistent than in health; dark, with a greenish tinge. Its pulp contained the usual elements, but in addition there was a great deal of granular pigment, either free or contained in granular cells.

*Liver.* Slightly enlarged, extending in line of nipple one inch and a half below rib-margin; dark and slightly mottled externally; section-surface presenting a fine, dark olive color, very similar to the darker varieties of bronze. Gall-bladder full of dark bile; no gall-stones. Under the microscope the

hepatic cells appeared of normal size and shape, with no excess of fat or increase of areolar tissue; but in every portion of the organ large numbers of pigment granules were found, either free or forming part of the cell contents.

*Kidneys.* Quite small, firm, grayish-red on section. Suprarenal capsules healthy. Pigment was found in the intertubular capillaries, in the Malpighian tufts, and also free, in the form of large, black, angular grains.

The bladder contained a little more than one fluid drachm of cloudy urine, highly albuminous, depositing many varieties of epithelium, principally vesical, numerous granular casts, and small black pigment masses.

Remarks.—This case has many features in common with most of those reported by Frerichs. Note the albuminous urine associated with granular casts and pigment.

Case III.—*Remittent Fever. Delirium; Stupor; Convulsions; Death. Albuminous urine with casts and pigment. Pigment in the blood and tissues.*

Franklin Bean, æt. twenty-seven, born in Maine, was admitted to the Pennsylvania Hospital September 10th, 1865. He had been captain of a vessel running between Philadelphia and Georgetown, South Carolina; and, on the trip northward, when all of his crew but two were seized with malarial fever, he, with the two men, worked the vessel to this port, so that by the day he arrived—Saturday, September 2d, 1865—he was utterly exhausted both in mind and body. He had a chill on the Monday morning following, and was forced to go to bed on Wednesday, September 6th. He had no second distinct chill, but a continued febrile action, with marked, though somewhat irregular remissions. There was occasional bilious vomiting; bowels constipated; no cough nor epistaxis. *On admission*, at 10 A.M., his symptoms were those of intense prostration; there was considerable hebetude, with occasional delirium, but generally he could be roused to answer; constant restlessness and jactitation, with painful feeling of præcordial oppression. Respiration sighing; pulse small, 108 per minute; tongue

dry, but not heavily furred; belly tympanitic, showed no eruption; spleen somewhat enlarged; liver of normal size, but sensitive to pressure. His skin was hot and dry, and he evinced great thirst, with utter anorexia. On the morning of admission he took Cinchoniæ Sulph., gr. xxxvj, and whiskey at the rate of f℥xv daily.

11th. There was still marked hebetude, with jactitation. The heat of skin less, with more moisture; tongue very dry; respiration irregular, shallow, or sighing; pulse 110, small and feeble; belly still tympanitic, although the bowels had been opened by an enema. Blood drawn from the finger showed about normal average of white corpuscles; red corpuscles pale, many of them crenated; and several large black pigment masses. Cinchoniæ Sulph., gr. xxx; Spt. Frumenti, f℥xxiv, daily. Toward night a distinct remission occurred; skin grew cold; pulse became smaller, and ran up to 148 in a minute. Ordered Quiniæ Sulph., gr. xxiv, and additional stimulus, with Ammoniæ Carb., gr. v, q. h.; external heat being also constantly applied. Partial reaction was thus brought about; but on the following morning, September 12th, his pulse was again 145, and very feeble; delirium alternating with the deepest hebetude; thirst gone; bowels quiet; skin hot and moist (temperature in right axilla 108° F.), on extremities shrivelled; pupils dilated. Ordered Quiniæ Sulph., gr. xxiv; alcoholic stimulus and ammonia as before. The prostration steadily increased; vomiting came on at 4 P.M.; convulsive movements at 5½ P.M.; death at 6 P.M.

*Autopsy, four hours after death.*—Body not much emaciated. Unusual rigor mortis.

*Brain.* Darker than in health; somewhat congested on convexity. About half an ounce of serous effusion at the base. Veins of cerebellum congested.

*Thorax. Lungs* entirely free from adhesions; deeply congested posteriorly in the lower lobes; heart healthy; its muscular fibre red and firm; f℥ij of serous effusion in the pericardium.

*Abdomen. Stomach* healthy. *Small* intestine was moderately distended by gas; contained some semi-solid fæces, and

had a large quantity of viscid mucus adhering to its inner coat. Toward the lower part of the jejunum a large number of reddish points were seen, but slightly elevated, evidently congested solitary glands. In the ileum the solitary glands were prominent and red, but none of them ulcerated. Peyer's patches were more distinct than usual, even up to the upper end of the ileum, whilst toward the ileo-cœcal valve they were congested and very evident; but in no instance was there either abrasion of the mucous membrane, or marked enlargement of the gland elements. The *large* intestine presented no lesion; mesenteric glands not enlarged.

The *liver* was not enlarged, contained a great deal of blood, was much mottled on the outer surface, and in places, especially over its left lobe, decidedly bronzed. The section-surface was glistening, presented neither prominence, nor very marked congestion, of acini,—in color lighter than normal, but bronzed. Gall-bladder moderately full of black inspissated bile. Under microscope the liver cells were seen to be of good shape, containing one or two distinct nuclei, and dark-reddish granules, highly refracting, but irregular and angular in form; there was also a great deal of floating granular matter and free masses of pigment. The bile contained the epithelium of the gall-bladder, brownish-yellow granular matter, and pigment masses.

*Kidneys* much congested. Urine drawn from the bladder was decidedly albuminous, depositing granular casts, epithelial cells, fibrinous flakes, and pigment masses.

*Spleen* three times its natural size, and besides the normal elements of its pulp, contained reddish, granular, fibrinous flakes or pigment scales, large free pigment masses, and cells (in size and granular appearance closely resembling white corpuscles of blood) with pigment granules, even in the nucleus; certainly the granules were in the cell contents, *i. e.* within the "formed matter."

*Blood from portal vein*, just above junction of splenic vein, contained many crenated corpuscles, a slightly-increased number of white corpuscles, and large black pigment masses.

*Blood from vessels on convexity of brain* also contained crenated corpuscles, with pigment masses of the same size and shape as those of other parts. It is to be regretted that circumstances prevented an examination of the brain structure itself.

Remarks.—The rapid course of this case may no doubt be properly referred in part to the excessive physical and mental exertion which the patient had undergone. The peculiar mode of its termination—convulsions preceded by delirium alternating with stupor, which latter conditions became established in at least three days after the first confinement to bed—together with the changes in the blood and urine, indicates its close relationship to the previous cases. The causes which combine to form pigment matter were evidently in active operation, but had not had time to produce so large an amount as in the former instances.

Case IV.—*Quotidian Intermittent. Convalescence; Supervention of Dysentery; Death. Pigment in Spleen and Liver.*

Andrew Peter, sailor, 27 years of age, admitted September 13th, 1865. Eleven days before, while lying in port at Richmond, Delaware River, he was attacked with quotidian intermittent. This was checked (after admission) by antiperiodic doses of cinchonia sulph., and he advanced slowly in convalescence, using a gentian and iron mixture to repair the injury effected by the disease. Though weak, he was up and aided occasionally in ward work. On Wednesday, Sept. 26th, he complained of slight diarrhœa; a little blood in the stools, and some tenesmus. There was no assignable cause for this. Ordered: Rest in bed; laudanum enema; regulated diet.

Thursday, September 27th. Symptoms aggravated; occasional hiccough. Ordered: Laudanum and castor oil by the mouth; after fecal stools, a laudanum enema every four hours. Sinapisms to abdomen.

Friday, 29th. Hiccough continues, with nausea. Stools increasing in frequency and consist almost entirely of blood

with jelly-like mucus. Much tenesmus. Face dusky, anxious. Pulse frequent, hands and feet cool. Great thirst. Tongue slightly coated, dryish. Abdominal tenderness, particularly in hypogastric region. Occasional dysuria.

From this time the course of the case was that of severe dysentery, through the daily details of which it is unnecessary to trace it here. On Saturday, 30th, the febrile paroxysms reappeared, and, the stomach being almost non-retentive, these were treated with repeated hypodermic injections of sulphate of quinia. These were efficient, and their employment was suspended after the following Tuesday—as he then became able to take medicine by the mouth. The treatment was carefully adjusted to meet the various indications, but he died on Wednesday, October 11. The termination of the case was preceded, as is usual under such circumstances, by a prolonged condition of partial collapse—running, contracted pulse; very sluggish capillary circulation; limbs and face cold, belly warm; face dusky, distressed; cheeks sunken, brows contracted, nose pinched, voice feeble and husky; vomiting and singultus persistent. The stools were shown by the microscope to consist entirely of blood, mucopus, and altered blood grains of all sizes, evidently from the intestinal ulcers. Blood from the finger was thick; red corpuscles dark, their contour usually normal; rouleaux formed irregularly in masses; white corpuscles increased in number, and large.

*Autopsy, four hours after death.*—Cerebral cavity not opened.

*Thorax.* Lungs pale anteriorly, congested behind, crepitant throughout; no deposit of tubercle. Pleural cavities without effusion; a few points of adhesion. Heart normal; cavities almost empty.

*Abdomen.* Liver not enlarged; scarcely darker than natural. Spleen increased in size about one-half; dark and mottled. Kidneys appeared healthy. Mesenteric glands enlarged, firm; pink on section. No peritonitis. The diseased condition of the intestine commenced abruptly about two feet above the ileo-cœcal valve. From that point to the

anus the coats were thickened, softened, and the mucous membrane almost entirely destroyed by dark, rough, corrugated ulcers. The microscope revealed in the splenic pulp abundant pigment granules, free, aggregated, and in the cells; also scattered angular masses. The same were found in smaller quantity in the liver.

Remarks.—The complicated character of this case does not interfere at all with the interpretation of the peculiar conditions formed in the spleen and liver, since these have no recognized connection with inflammation and ulceration of the intestinal wall. They must, therefore, in an analysis of the pathological processes, be associated with the malarial element. That dysentery may result directly from the influence of miasmatic poison, is well understood, and the subject need not be here considered. The colitis, in this instance, from the time and mode of its occurrence, appears to have had an independent source.

Case V.—*Malarial Fever. Obstinate Vomiting, Jaundice, Stupor, Death. Chronic Peritonitis. Submucous Intestinal Œdema. Hyperœmic Liver. Pigment in Blood.*

Isaac Hern, negro sailor, æt. 45, was admitted to the Hospital August 19, 1865. But little history could be obtained. He had been taken ill with chills and fever while on board a vessel lying in the Potomac, and had been neglected during the voyage to Philadelphia; receiving, moreover, a blow upon the head. On admission, his condition was one of great prostration; voice weak; pulse feeble; mind dull; skin harsh, dry, and feverish; conjunctivæ jaundiced; bowels constipated; vomiting frequent; urine scanty, albuminous; belly retracted; spleen not much enlarged; liver somewhat increased in size; and hepatic region sensitive to pressure.

On the morning of the 20th he had a chill, followed by fever and sweat, after which he remained cold during the following day. From this time the progress of the case was marked by increased tenderness in the hepatic region; frequent and obstinate bilious vomiting; irregular singultus; failure of the circulation; and constantly deepening stupor.

He was treated with antiperiodic doses of quinia, alcoholic stimulus, and concentrated nourishment, both by the mouth and rectum, but died on the evening of the 25th.

*Blood* pale; white corpuscles in excess; a few small pigment granules.

*Autopsy, twelve hours after death.*—Body emaciated; moderate rigor mortis. Lips and tongue stained yellow. Spinal cord not examined.

*Brain* healthy; some serous effusion at the base.

*Thorax.* No hydrothorax. Lungs crepitant; congested posteriorly; heart structure healthy.

*Abdomen.* Diffuse chronic peritonitis. Delicate, but firm adhesions, evidently of long duration. Intestinal mucous membrane stained with bile, and elevated by marked submucous œdema, in circumscribed areas, pitting upon pressure. The tissue thus affected had a gelatiniform appearance, and a smooth, velvety feeling. Mesenteric glands enlarged from pea to almond-size; tinged, as intestinal walls, with bile. Liver somewhat enlarged; suggested bronze liver; was very hyperæmic. Kidneys healthy. Spleen not enlarged; softer than natural. Pancreas apparently healthy. There was no pressure on the gall-duct. Gall-bladder contained grumous, grayish-brown bile. Blood contained many white nuclei and a little pigment.

Remarks.—This case was a mixed one, and it is of no advantage to consider here the old peritoneal adhesions and more recent intestinal œdema. It presents itself to us as an instance of malarial fever, with peculiarly marked disturbance of the hepatic functions, in which death was probably rendered inevitable, and certainly hastened, by neglect, partial starvation, and physical injury. Unfortunately, the record gives us no account of the condition of the splenic pulp as revealed by the microscope, but we have the statement of some pigment in blood from the larger vessels.

Case VI.—From a report of a case which occurred under my care, of "*Acute infiltrated tubercle, associated with malarial fever—death in twenty days*,"—I take the following extract:

"*Abdomen.* The *liver* was found somewhat enlarged, tur-

gid, imperfectly bronzed, and contained large black granules of pigment.

"The *spleen* was double the normal size, soft and dark, and contained a great deal of pigment. The kidneys were intensely congested. The urine, drawn by catheter, was highly albuminous, very deficient in chlorides, and deposited vesical epithelium, granular tube-casts, and large black pigment-granules."

In the progress of the case, the malarial symptoms were masked by the more obvious phenomena connected with the tubercular deposits. But even under this complication the peculiar blood changes were produced.

The reader has now had presented to him the details of six fatal cases, with the post-mortem conditions, especially those observed with the microscope.* That the pigment granules and masses formed in greater or less abundance in all of these instances, as also in my previously reported cases, are not foreign bodies, but have their origin in some abnormal action within the organism, is sufficiently evident. That they are the product of certain alterations of the blood elements, I deem it unnecessary to prove, because I am not aware that pigment matter, whether in physiological or pathological association, has ever been referred to any other source.† As to their connection with any particular class of diseases, the observations recorded thus far certainly show that they are produced rapidly and in great abundance during the progress of miasmatic fever. That they may not

* I am indebted to Dr. Horace B. Hare for the opportunity of examining the blood and viscera from still another fatal case of bilious fever. The appearances corresponded closely with those described above: pigment free, and in cells and scales, both in the current of the blood and in the extravascular tissue.

† "*That the groundwork of pigment is the coloring matter of the blood*, appears to us proved, the cases in which pigment is obviously derived from hæmatin and blood-corpuscles being so numerous as to exclude all doubts on the subject,—still, the circumstances by which the conversion is brought about, and still more, the various shadings of the pigment, are unexplained."—*Path. Anatomy*, Rokitansky, Syd. Ed., London, 1854, vol. i, p. 208.

originate in some other pathological conditions, could, of course, be demonstrated only by a very extended series of negative observations; and while pursuing such an inquiry, the uncertain time during which these matters may be retained in the tissues should be carefully remembered in the examination of all cases where an obscure history renders it impossible to say that the patient has never suffered from any malarial disease.

In the microscopic study of many viscera and of blood from the portal vein, conducted with special reference to the existence or non-existence of pigment therein, I have failed to find it in cholera, typhus or typhoid fever, the different forms of Bright's disease (acute, fatty, and granular atrophy), jaundice, cirrhosis, cancer, and fatty degeneration of the liver, alcoholismus, white cerebral softening, and diseases of the heart. Not having closely scrutinized the tissues with a similar purpose, in other of the zymotic or blood diseases than those included in the above enumeration, I can only refer to the many histological researches concerning them familiar to all. But whether pathognomonic or not, the intimate and pre-eminent connection of this pigment-matter with the intermittent and remittent affections remains a most interesting fact. From the very different amounts in which it has been found in the several cases, there is much reason to believe that other elements may combine with the duration and type of the attack to influence the extent of its production in any particular instance. Frerichs has noticed this, and says that since the Silesian epidemic of 1854, cases of such marked character "have very seldom been met with there, although the ordinary forms of intermittent fever are never absent" (vol. i, p. 355). A full explanation of this point can only follow more accurate information. No one, I think, can read the details given above, especially of the three uncomplicated cases, without being amazed at the disastrous effects of the miasmatic poison upon the blood, and through the medium of the bloodvessels, upon most of the important organs of the body. Beginning at the spleen, which is most constantly and most seriously affected,—en-

larged, softened, radically changed in color, its tissue and its blood loaded with a new unnatural product,—we pass on to the liver. This is nearly always found somewhat enlarged, hyperæmic, of altered hue, and with much pigment entangled in its structure. The blood of the portal and hepatic veins contains, often in very large quantity, pigment granules, grains, cells, and flakes, or scales. The capillaries of the cardiac walls have received the same material, and free masses show themselves among the fibres. Again we find it in the kidneys, caught in the Malpighian tufts, or, after rupturing these, in the uriniferous tubules. Lastly, it presents itself in the cerebro-spinal axis, chiefly in the form of minute granules within the capillary tubes, so as to change the natural whitish and gray tints to a leaden or India-ink hue. Nothing that I have seen in pathology, has filled me with more surprise and interest than this condition of the nerve centres. I have long held the opinion that malarial disease, even in its milder forms, is a much more serious affair than is generally thought; that its effects upon the economy are more lasting, and the injury it inflicts upon the vitality of the subject greater than its seeming nature will explain. Its wonderful obstinacy, the perverse manner in which it breaks out again and again, after having been apparently lulled to rest, had frequently not only baffled my attempts at a radical cure, but filled me with an unwilling admiration of its marvellous tenacity. In reading the work of Dr. Frerichs, and in confirming in this country the correctness of his observations, I seemed to comprehend for the first time the true nature of the disease, and to appreciate the real cause of its persistency.

Closely connected with this part of the subject are interesting questions as to the possibility and mode of elimination of the pigment-matter; the length of time during which it may remain in the system; and whether it be at once the product of diseased action and itself the cause of farther evil in the economy, or the former only. Mere speculation is a poor substitute for the light of facts, but upon the subject of elimination we have little else.

The occasional escape of a few grains with the urine and in an unaltered condition, however interesting in its special relations, is no guide to us in attempting to ascertain the mode in which it may be removed from the other viscera. But that this may be accomplished, at least in part, seems probable. Rokitansky concisely states, that "the resorption of granular pigment is a fact," and there leaves the matter.* I shall soon have occasion to refer to a case in which pigment was found in the structure of the brain, liver, and spleen, after it had in some manner ceased to exist both in the blood-current of the larger vessels and in the capillaries. If there be a process, or a series of processes, by which it can be metamorphosed in the blood, and so through the medium of the excretory agencies disappear from the closed tubes of the vascular system, then an analogous transformation may render possible its removal when entangled in the solid structures. But in any case the work must be a very slow one, and we are certainly ignorant of any constituents of the animal organism, which alone or combined can dissolve a substance capable of resisting alike the most powerful acids and pure alkalies. Indeed, in the absence of observations to the contrary, it may well be doubted whether the large masses of pigment can ever be entirely eliminated; and how nature, with all her varied and beneficent arrangements for saving and prolonging life, can rid the capillaries of the brain and spinal cord of the extraordinary number of granules found there, it is difficult to understand.

*How long does the pigment-matter remain fixed in the organic structures?* No precise answer can as yet be given to this question, but such facts as have been recorded, tend to confirm the idea presented above, that the period must be a long one. From my notes of a case of general acute tuberculosis, I make the following extract: The brain, heart, liver, lungs, peritoneum, and kidneys, were subjected to microscopic examination. Little black points in the kidneys,

* Op. cit., vol. i, p. 211.

very evident to the unaided eye, proved to be granular and flake deposits of pigment, partially in the extravascular tissue, partially in the capillaries. The liver contained only fine granules, but in the brain and heart were many large and small angular black masses. The patient had suffered from a very severe attack of malarial fever *eighteen months* before death, and with a mild transient recurrence of it within that period. In this case the pigment was no longer to be found in the blood. Dr. Alonzo Clark* says, "It may be interesting to state that in the last few years I have, in two instances, inspected the livers of persons who had had remittent fever a year and more before their fatal sickness. In both of these the remittent color still remained, less intense than in recent cases, but yet well marked, and the microscope disclosed the coloring matter unchanged, except, perhaps, in quantity." Frerichs does not consider this subject, and I have been unable to find other observations bearing directly upon it. These, however, are sufficient to show that many months, and probably years, must elapse before pigment-matter once deposited can be removed from the system.

The great importance of this fact becomes manifest when we pass on to inquire in what degree this product of diseased action is itself a morbific agent,—*i. e.*, how far it may derange the action or impair the function of those organs in which it lingers. In attempting to determine the significance of any particular element as a factor in the production of the phenomena of disease, we are at once perplexed by the uniform obscurity with which, beyond a certain point, the etiology of constitutional disorders is enveloped. Not understanding the essential character of the original poison, nor its immediate mode of operation, we cannot know how many of these phenomena are to be referred to the *direct* action of this poison upon the chemical constitution of the blood and tissues, or to its specific influence upon the various organs; and how many, on the other hand, must be included among

* Op. cit., vol. i, p. 614.

its *indirect* or secondary results, consequent upon such primary alterations. Thus the stupor and delirium of typhus may be plausibly referred to a direct impression upon the cerebral centres, or interpreted as an "oppression" of those centres by the products of destructive metamorphosis which load the blood. But, however classified, these various conditions cease permanently when the patient becomes convalescent, and the original poison, together with its products, disappears from the system. Not so in malarial affections. Their history presents a peculiarity which is in strong contrast with what is known concerning all other "blood diseases." I do not now refer to that persistent cachexia into which a protracted intermittent or remittent fever too frequently passes; for although its features are so singular as to lead us to suppose *à priori* that some deleterious matter must be retained within the body; yet to a certain extent they find their analogues in the mental and physical debility and organic lesions which succeed severe attacks of typhoid fever, scarlatina, diphtheria, and their companion disorders. The distinguishing character of miasmatic fever is its tendency during one, two, or many years after the patient has apparently recovered, to recur without any fresh exposure to the cause.* Other constitutional affections either leave no such tendency behind them or positively protect the individual against a repetition of their visit.

When, therefore, on the one hand we fail to find any abnormal substance within the organism in cases where this tendency does not exist; and, on the other, uniformly discover an unnatural matter diffused through the organs in the only disease where such a tendency *is* present, the mental process which suggests that the two facts are intimately connected, becomes something more than pure speculation. This tendency varies very much in individual instances; so also does the amount of pigment produced. How far the strength of the one corresponds to the amount of the other, we must leave to farther observation to determine. I only

* Prac. of Med., Wood, Philad., 1866, vol. i, p. 279.

offer the suggestion. It would be easy to frame hypotheses as to the manner in which the existence of pigment might promote the return of malarial paroxysms. Thus the masses might be supposed to retain in a dormant state the original poison, from the union of which with the blood-corpuscles they had resulted. Then, if the circumstances, such as over-exertion in hot weather, which are prone to bring on a renewal of the disorder, are those also which facilitate the resorption of this matter into the blood, the miasmatic influence would be again at liberty to act. Professor Frerichs, in discussing the results of the formation of pigment upon the structure and functions of the various organs, keeps in view only its probable *mechanical* agency in the production of some characteristic phenomena of the disease while in progress, and makes no reference to the subject of recurrence. He attributes, without hesitation, to the obstructed capillaries of the liver (producing portal congestion), those gastro-intestinal hemorrhages, diarrhœas, peritoneal effusions, and derangements of the hepatic function, not infrequently observed.

The extent of our present knowledge of the connection between the deposit of pigment in the substance of the brain and spinal cord and the abnormal cerebral and nervous symptoms, is so clearly stated by Frerichs that I quote the following passages: "That these are connected with one another as cause and effect is a probable supposition, which acquires the more weight from the fact that in general there is an unmistakable correspondence between the intensity of the two. Hence, the earlier observers, and especially Planer, had no hesitation in attributing the cerebral symptoms* to the occlusion of the capillaries with pigment. I cannot give my unconditional support to this view, however plausible it may at first sight appear, because a close analysis of the observations, and a careful comparison of the anatomical lesions with the symptoms during life, render the connection be-

* He includes under this term, headache, neuralgia, giddiness, somnolence, impaired mental action, delirium, coma, and disturbances of mobility, such as convulsions, or paralysis.

tween the two, as cause and effect, in many cases at least, doubtful. . . . On comparing the post-mortem appearances with the symptoms during life, we find on the one hand cases where, in spite of the dark coloring of the brain, no cerebral disturbances have been present, and on the other hand, cerebral disturbances without any deposit of pigment. The last statement I have found to hold good six times out of twenty-eight cases of *intermittens cephalica*. . . . I have already called attention to the circumstance that in melanæmia the extensive decomposition of the blood pours periodically into the circulation, not merely the debris of the morphological disintegration of this fluid, but also the products of its chemical metamorphosis, which elude microscopic examination. A closer study of these metamorphoses may bring us nearer to the source of the cerebral symptoms."*

My own observations agree with those of Frerichs, and differ from those of Meckel and Planer which he quotes, in containing no record of capillary apoplexies in the brain. Yet it is difficult to understand how the angular grains could exist in the extravascular cerebral substance unless there had been a rupture of the capillary walls, and it is indeed difficult to dissociate entirely the feelings of languor, muscular weakness, liability to fatigue upon slight exertion, habitual depression of spirits, disturbed sleep, mental torpor, and neuralgic pains,† of chronic miasmatic cachexia, from the microscopic appearances of the leaden-colored nerve centres.

Frerichs claims a "blood-forming function" for the spleen, and says that this is interrupted at the same time that innumerable blood corpuscles are destroyed. He adds, "An increase of the colorless corpuscles, as a consequence of the disease of the spleen, is not observed." I shall refer to this point hereafter.

The renal function is frequently interfered with. Frerichs found albuminuria in twenty out of fifty-one cases, "in two of which there was hæmaturia, and in five suppression of

* Op. cit., vol. i, pp. 329, 330.

† Wood, op. cit., vol. i, pp. 281, 308.

urine; albuminuria occurred without any pigment in four cases, whereof two were instances of lardaceous degeneration of the kidneys; in five cases pigment could be detected where there had been no albumen in the urine, but the quantity was scanty."* The testimony of Maclean is somewhat different:† "Albuminous urine is the rule in yellow fever, a rare exception in remittent." But we find also this statement: "Albumen is found in an uncertain proportion of cases during the fit, with blood and renal cylinders. I can confirm, from personal observations, Dr. Parkes' remark, that chronic Bright's disease is a consequence of ague. Many 'old Indians' who have suffered from malarial fevers, die of this disease."‡ In the six fatal cases which I have reported, albuminuria was observed in three, and in these, as in five others not fatal, was associated with pigment. The pigment in the brain is usually composed of fine granules, frequently aggregated; but as seen in the kidneys it is more often in the form of angular grains frequently caught in the Malpighian tufts like calculi in the canal of a ureter. The remaining organs do not present remarkable derangements of function.

The question as to the place of formation of the pigment-matter is one rather of general interest than of special practical importance. Undoubtedly, it is the result of the action of some agent upon the blood, and the interior of the spleen would most readily furnish favorable opportunities for such action, particularly during the paroxysmal congestion of that organ, but though thus most abundantly and frequently formed, and so carried through the portal vein to the liver, and thence, passing through the hepatic capillaries, to the most distant organs, yet we may safely regard a portion of what we find in the tissues as having existed there *ab initio*. And that the spleen is not exclusively the seat of its production is sufficiently clear from the report of a case in which

* Frerichs, op. cit., vol. i, p. 334.

† System of Medicine, Reynolds. London, 1866. Vol. i, p. 75.

‡ Id., p. 59.

pigment was found abundantly in the liver, blood, and kidneys, but none in the lardaceous spleen.*

I pass on now to a brief consideration of the physical characters of malarial pigment, and the diagnostic value of blood-examinations during life; with some further statement as to the morphological changes in that fluid. This adventitious matter occurs in the form of granules, mere molecular dots, very numerous, isolated, loosely aggregated, or "connected together in groups (flakes and scales) by a pale substance soluble in acetic acid and in caustic alkalies." The capillaries of the nerve centres usually contain it in this form (the larger particles not readily passing so far), and the granules often appear as though embedded in the vascular walls.

Then again we find these granules contained in cells, not otherwise distinguishable from white blood- or splenic corpuscles in their ordinary condition.† Sometimes these cells have an oblong, or even spindle-shaped outline.‡ They occur most abundantly in the spleen and portal vein, but appear also, in aggravated cases, throughout the organism. In the liver the molecules are seen adherent to, or contained within the hepatic cells; *i. e.* within their "formed material." Still other, and not less frequent, forms are those of the grain and larger mass; which are distributed in an analogous manner, and are found even in the brain in an extravascular position. Some of these, upon pressure, look like "fragments broken off from yet larger masses." Their *size* varies indefinitely from a mere dot up to grains many times as large as red blood globules. Frerichs states that some of the masses are $\frac{1}{100}$ of a line in breadth and $\frac{1}{20}$ of a line in length; and these he regards as probable casts of the smaller vessels. My own measurements correspond closely with these. I have not recorded any isolated grains of more than $\frac{1}{1200}$ of an

* Frerichs, op. cit., vol. i, p. 323.

† Pre-existent nucleated cells (of various forms) take up hæmatin, which as the contents of the cells becomes molecular pigment. Rokitansky, op. cit , vol. i, p. 210.

‡ Cell. Pathology. Virchow, p. 257. Frerichs, op. cit., vol. i, p. 320.

inch in breadth, but have frequently observed aggregations of granules and "larger masses" which measured $\frac{1}{800}$ to $\frac{1}{700}$ of an inch; $\frac{1}{1200}$ to $\frac{1}{1500}$ of an inch was an approximate average size of the separate grains.

Now when we bear in mind that the common width of red blood-corpuscles is in man about $\frac{1}{300}$ of a line, and of the white corpuscles $\frac{1}{250}$ of a line, we see that many pigment grains would be necessarily arrested where these could pass. And in different structures of the body the capillaries range only from $\frac{1}{500}$ to $\frac{1}{100}$ of a line in diameter.*

In *shape* these pigment-grains are very irregular, rounded, or sharp, with an angular, brittle-looking outline. Indeed the sharpness of their angles, which, however, are in no degree definite or uniform, "has suggested the term *crystalloid* as applicable to them (Lebert), or rather to the pigment-material common in the lungs."† And I may here allude to their close resemblance to the black matter so frequently seen in old coagula; in patches of chronic inflammation and ulcers of the intestines; and in the fluids vomited in cases of gastric cancer with a bleeding surface. Some writers go so far as to claim an identity,‡ but this is certainly premature. We cannot safely assert more than their common origin in some blood metamorphosis.

In color the pigment varies almost as much as in size and shape. Usually it is deep black, quite opaque, and with abrupt, non-translucent margins. Then, again, we find a brown rim through which some light passes. Frequently the color is reddish-brown, or even reddish-yellow, as seen by transmitted light, and the granular scales are seldom opaque. In the splenic pulp I satisfied myself of the existence of red blood globules in different stages, not only of disintegration, but also of advancing metamorphosis toward black pigment, and am therefore prepared to agree with Frerichs, "that these different colors represent the various stages in

* Human Anatomy, Leidy, Philada., 1861, pp. 337, 339.

† Clark, op. cit., p. 611.

‡ It is the *pseudo-melanose* or *éléments hématiques* of Lebert; when crystalline the *hæmatoidin* of Virchow.—*Clark.*

the transformation of the red pigment of the blood into melanotic matter." I have occasionally seen tinged gelatinous particles, as though there was a union between the coloring matter and some protein element. But of their intimate chemical nature we are ignorant. All agree, however, that while the pure black forms resist the action of even the strongest acids and alkalies, the paler products lose their color with greater or less rapidity under the influence of these reagents.

In conclusion I would earnestly urge the importance of investigating those chemical changes in the blood which must accompany the morphological alterations, and whose products, not to be discovered by the microscope, must yet have an important connection with the phenomena of this disease.*

*Diagnosis.*—Frerichs says,† "A perfectly accurate diagnosis can only be made by direct examination of the blood; a few drops carefully collected, so as to avoid contamination with any foreign matter, are sufficient to determine the absence or presence of large quantities of pigment." This statement may have been strictly true in relation to the large number of extraordinary cases upon which the observations of that gentleman were made, but requires much modification to adapt it correctly to my own field of investigation. I have records of ninety examinations of blood from cases of malarial fever, made in 1865 carefully, and often repeatedly, during life. In only one case did I fail to see particles identical in appearance with those above described. The blood was obtained by pricking the end of a finger after it had been carefully cleansed with a sponge and towel. I thus hoped to "avoid contamination with any foreign matter." But having found these particles existing in the blood of those who had never suffered with miasmatic disease, and also in that of patients whose tissues after death exhibited

* The discovery of "animal quinoidine," by Dr. H. Bence Jones, seems to be an initial step of great importance in this line of inquiry. See Med. Times and Gaz., Aug. 18, 1866, and Am. Journ. of Med. Sci., October, 1866.

† Op. cit., vol. i, p. 355.

no such matter, I was led to conclude that there was some element in the examination which vitiated the results. I soon discovered that there are frequently entangled in all parts of the epiderm particles of dark matter which are not easily distinguished under the microscope from malarial pigment as seen in the spleen; and that when the blood-drop was permitted to exude upon the finger-end, these became mingled with it. Upon attempting to evade this difficulty by incising the mucous membrane of the gums, I was several times baffled in the same way. The following plan was then resorted to: The integument (usually under the edge of the scapula) was cleansed with sponge and towel, and held upon the stretch between two fingers. It was then pierced with the fleam of a spring lancet, and (the wound not being allowed to close, but its lips held altogether apart), a little blood was carefully taken from the bottom of the wedge-shaped opening. Admixture with any elements of the epiderm was thus entirely prevented, and the contents of the small vessels of the true skin and subcutaneous tissue obtained pure. In 1866 there were twenty-five blood-examinations made in cases selected from more than double that number, as those in which the influence of malarial poison was manifested in a very positive and severe manner, either by the production of violent acute remittent fever, or marked quotidian and tertian intermittent, or an aggravated form of miasmatic cachexia. In none of these instances was pigment discovered. In only two patients (Case I of this paper, and Case III of my former article) was the blood obtained during life seen to contain not only granules and grains, but *pigment cells* also.

In addition to the records concerning pigment, notes were made of the appearance of the red and white corpuscles. By the tabulated statement of the one hundred and fifteen observations, and a comparison of these with post-mortem appearances, I feel justified in the following conclusions:

1. That in examining blood during life with a view to determine the presence or absence of pigment-matter, great care is necessary to exclude all foreign particles from the epiderm or elsewhere.

2. That pigment may exist abundantly in the visceral capillaries, and in the contents of the portal vein and other large vessels, when blood obtained from the derm and subcutaneous tissue does not exhibit it.

3. That only in cases of excessive pigment development will granules and pigment-cells be visible in such blood.

4. That in the acute stages of malarial fever, the red blood corpuscles are darker than natural, appear soft, are sometimes crenated, readily yield their coloring material when mingled with water, and are disposed to mass irregularly rather than to form distinct rouleaux.

5. That as the disease progresses they are rapidly and very greatly diminished in number, become pale, lose their tendency to aggregation, and either remain isolated or arrange themselves in imperfect columns.

6. That in the early stage of the disease, the number of white corpuscles is not perceptibly increased, and that later their increase, though very irregular, is always observable; from six to thirty-five appearing in the same microscopic field which presents in normal blood only two or three.

7. That excessive anæmia, with a large increase in the number of white corpuscles, may exist in malarial cases without marked enlargement of the spleen.

8. That no other morphological alterations are to be detected except, as also in some cases of severe anæmia from other causes, certain colorless, highly refracting granules, free or in membranous-looking fragments, appearing like white corpuscles broken up, and giving to portions of the field a filmy, clouded aspect.

Thus we see that our diagnosis, except in the most aggravated cases, cannot safely rest upon an examination of blood from the peripheral vessels. The following extracts are interesting in this connection and may appropriately conclude this part of the subject. "M. Forget examined 123 specimens of blood, derived from patients in all stages of enteric fever. Of the blood drawn during the first period of the disease, only about $\frac{1}{18}$ of the specimens exhibited appreciable softening. In the second period $\frac{1}{7}$ of the specimens exhibited

this change."* "Under the microscope it is stated that the corpuscles (in typhus) are crenate and misshapen and do not adhere into rolls, but run into amorphous shapes."†

I wish to call the attention of the reader to the occurrence of a herpetic eruption about the mouth and nose as a symptom of malarial disease. The eruption is sufficiently frequent to become of decided value in making the diagnosis. In the 53 cases of the second series of this paper, it was present in 39, absent in 14. It consists of the ordinary herpes, in the form of single vesicles, or groups of vesicles, seated usually on the very edges of the lips, on the upper or lower lips, or about the alæ nasi. It is very rare in pure typhoid fever, so that its presence may assist materially in distinguishing remittent fever from the former disease. The fact that it is not present is less valuable, since, as was above stated, it was absent in 14 of 59 cases.

It occurs sometimes in the compound fever which was so frequent in our military hospitals and camps, and in our armies during the late war, to which the title of "typho-malarial" fever was so justly given. It is often present also, as is well known, in epidemic cerebro-spinal meningitis, but, in this disease, is more apt to appear upon the forehead and cheeks than about the mouth and nose.

I shall now present the reader with the details of a number of cases which are to a certain extent typical of the different varieties of malarial disease, and may at the same time illustrate some points of treatment.

Case VII.—*Miasmatic Cachexia.*—David Bennett, æt. 38, admitted Wednesday, August 29, 1866. A man of large frame; before his illness muscular and stout, now much reduced in flesh, having lost more than forty pounds in five weeks. Is so weak that he can scarcely walk; countenance heavy, sallow, haggard; eye yellow; skin harsh, inelastic, and disposed to leak; tongue pale and pasty, with uniform coat; no desire for food; lassitude and depression, amount-

* Syst. of Med. Reynolds, vol. i, p. 585.
† Id., vol. i, p. 549.

ing almost to torpor. Feeble, hurried breathing, and very imperfect expansion of the middle and lower lobes of the lungs, with impaired resonance on percussion, but no râles or evidence of consolidation.* Bowels moved twice in the first twenty-four hours after admission; first dejection thin, second formed; both very offensive. Spleen very slightly enlarged.

*History.*—Sailor. Went to Chesapeake Bay via the canal, and was taken sick there five weeks before admission. No febrile paroxysm has occurred, but only rapid prostration of strength, with loss of color and flesh.

Ordered: Beef tea and milk punch. Rest in bed.—℞. Cinchoniæ Sulph., gr. xvj per diem.

September 2d. Already a very positive improvement. Is hungry; sleeps well.

October 30th. Weighs 186 pounds, having gained 35 since admission.

The above case shows what progress miasmatic poison may make toward destruction of life without producing any febrile paroxysms. The two which follow are presented as representatives of another series, in which more or less extensive dropsy appeared as a sequela of the original disorder, and readily passed away under proper treatment.

Case VIII.—*Quotidian Intermittent. Dropsy.*—Edward Clarkson, an Irish laborer, 54 years of age, admitted September 20, 1865. Occasionally intemperate; health generally good. Has been living for two months in a malarial district in Maryland. Five weeks ago was attacked by a quotidian in-

* This condition is an exceedingly interesting one, and is often very marked. No measurement was made in this instance, but in relation to a case of similar malarial prostration I have the following note: On the morning of October 26th, without any pleural or pulmonary disorder whatever, his respirations were 44 per minute. Difference in circumference of his chest, at the level of the xiphoid cartilage, in forced inspiration (32⅞ in.) and forced expiration (32 in.), seven-eighths of an inch.

October 29th. After three days of rest, quinia and concentrated nourishment, forced inspiration 34¼ in., forced expiration 31¼ in.—difference three inches.

termittent, the paroxsyms of which occurred in the afternoon. The cold stage was not always developed into a positive chill, but was invariably followed by a short febrile reaction, and *prolonged*, *copious* sweating. The disease was partially arrested for a time, but on the day before admission the paroxysm was as severe as at any previous date. He was very much prostrated; skin pallid; flesh flabby; mind dull, almost stupid; tongue coated and foul. Feet and legs tensely œdematous. Urine acid, sp. gr. 1020, no albumen. Bowels irregular, constipation and diarrhœa alternating. No cardiac disease.

Ordered: September 20th, Cinchoniæ Sulph., gr. xxiv. September 21st, gr. xviij. September 22d, gr. xij. ℞. Ferri et Ammoniæ Citratis, gr. vij; Extracti Gentianæ fld. ♏x; Alcohol, f℥¾; Spt. Lavandulæ Comp., f℥¼; Aquæ, f℥iij. M. S. t. d.

October 4th. Still pale; but there has been no recurrence of the paroxysms; the dropsy has disappeared; the various organs have become properly active; appetite good; strength increasing; sleeps well, and his natural vivacity has succeeded the lethargy.

Case IX.—*Quotidian Intermittent. Anasarca; Ascites.*—Michael Greeley, an Irish laborer, æt. 40, admitted September 29, 1865. Temperate and industrious. Health good until nine weeks ago. During the two months previous to that date he had been employed as night-watchman on a floating-dock at the foot of Dickerson Street wharf, Delaware River. Overwork and loss of rest produced great fatigue. His illness commenced as a quotidian intermittent, with imperfectly developed evening paroxysms; sweats always exhaustingly copious. These continued for three weeks, and were then checked with quinia, but he was much injured by the disease. His feet soon became œdematous, and the swelling extended rapidly to the thighs and abdomen, involving the external genitals. Urine scanty, sp. gr. 1020, no albumen. No evidence of cardiac disease. The integument of the legs and scrotum is very tense, and the

ascites so great as seriously to embarrass his respiration. His skin is very pale, and the skin altogether resembles one of combined cardiac disorder and Bright's disease.

Ordered: Tr. Ferri Chloridi et Quiniæ Sulph. Also, Juniper and Cream of Tartar tea.

October 4th. Has passed a large amount of urine since yesterday and the dropsy is much diminished in the abdomen; arms quite natural; legs still tensely œdematous.

6th. Dropsy diminishing rapidly. Has passed six quarts of urine in twenty-four hours. The skin is also acting freely. His tongue is clean, his appetite good; he is much more comfortable; sleeps well; and has regained his vivacity.

9th. Dropsy all gone. Rapidly improving.

Discharged cured, October 30, 1865.

Epistaxis occurred in more than one-fourth of the cases; and several so closely resembled typhoid fever that they could be distinguished only by a very careful attention to the history, the absence of eruption, their response to quinia, and rapid convalescence. In all there was stupor, profuse epistaxis, *continued fever* for several days, diarrhœa, usually bronchitis, and no gastric disturbance. Such are Cases X and XI. Of another numerous series, the mixed or typho-malarial, where diagnosis was necessarily often longer delayed, I present only one instance: Case XII.

Case X.—*Severe Remittent Fever. Symptoms simulating those of Typhoid Fever.*

James Curley, æt. 17; admitted Tuesday, August 7, 1866. Shoemaker's apprentice at Smyrna, Delaware. Was treated last autumn in this house for malarial fever. Has been sick since Friday, August 3d, with headache, fever, and general distress. *Bowels have been moved two or three times each day*, and *his nose has bled. No vomiting or gastric disturbance.* Came to Philadelphia on Sunday morning, and at that time felt chilly. On admission: Pulse, 120, wanting in force; skin hot but not dry; is drowsy and dull, almost stupid, but still complains of headache; tongue uniformly coated, dirty

white; eyes dingy yellow. Herpes abundant upon his lips. Abdomen full but not tympanitic. No cough or pulmonary râles.

August 8th. Decided remission this morning. Pulse 85. Ordered: Quiniæ Sulphatis, gr. xvj.

9th. Another remission; pulse continues frequent; 100. Bowels quiet, but profuse epistaxis occurred last evening and this morning. Ordered: Repeat full antiperiodic dose.

10th. Complete remission; no drowsiness; pulse 76.

13th. Rapid convalescence; walks about the ward; herpes disappearing.

Discharged three days later.

Case XI.—*Severe Remittent Fever. Symptoms simulating those of Typhoid Fever.*

Nehemiah Tubman, æt. 28; sailor on oyster schooner in Delaware bay and river. Admitted on Monday, August 20, 1866. In the night of Monday, August 13, when lying off Fort Mifflin, he was seized with a decided chill, followed by fever, which, with uncertain remissions, continued up to the time of entering the hospital. He had severe headache, delirium, limb and back pains, and profuse epistaxis (subject to this in health). Received no medication until Thursday evening; then took a dose of Epsom salt, which operated early next morning, and very frequently through the day. Bowels continued loose and irritable on admission. High fever when seen on Monday at 12. No herpes or gastric disturbance. Eyes dirty yellow.

Ordered: Milk punch, f℥x, beef tea, f℥xxiv per diem. ℞. Quiniæ Sulphatis, gr. xvj.

August 21st, 11 A.M. Remission; pulse 72, slightly dicrotic. Bowels loose; and percussion-dulness noticed yesterday in left iliac region has disappeared; spleen somewhat enlarged.

Ordered: Quiniæ Sulph. gr. xij. Continue stimulus.

22d, 10 A.M. Sibilant râles in right lung. Pulse 80, large, decidedly dicrotic. Abdomen dry and hot; restless night; tongue still coated and bowels loose.

Ordered: Quinia as yesterday. ℞. Acidi Muriatici Diluti, gtt. xv, q. s. h.

23d. Temperature last evening 101½°. Three passages from the bowels since yesterday. Pulse 60; skin moist. ℞. Quiniæ Sulph., gr. viij.

24th. Bowels quiet. Pulse 64. Respirations 20. Temperature 99°. Febrile exacerbations appear nearly checked, and the case no longer possesses the strong resemblance to typhoid fever. ℞. Quiniæ Sulph., gr. viij.

27th. Convalescence uninterrupted. Permitted to sit up for two hours.

Case XII. *Typho-malarial Fever. Symptoms curiously mingled.* Michael Cristella, æt. 13, errand boy. Admitted Thursday, August 2, 1866, with the general symptoms of continued fever. Said he had been sick nearly one week with severe headache, languor, and aching; but no chill, epistaxis, or diarrhœa had occurred. Pulse 80, weak and dicrotic; skin dry and hot; abdomen full, meteoric; no eruption. Respiration quiet. No pulmonary râles. Conjunctivæ dirty yellow. Lies heavily with closed eyes, but answers with slow intelligence when aroused. Tongue dryish, and uniformly but not heavily coated. Temperature 104¾°.

Ordered: Beef tea. No stimulus. ℞. Acidi Muriatici Diluti, gtt. viij, q. s. h.

August 5th. Bowels opened once yesterday; dejection formed; continued fever; pulse 74. Complains of soreness on pressure in right iliac region.

6th. Sudamina present; no eruption; belly softer; pulse rather weaker. Temperature (evening) 104½°. Persistently stupid.

Ordered: Spt. Vini Gallici, f℥ij, t. d.

8th. A decided remission this morning, the first noticed.

Ordered: Quiniæ Sulph., gr. xij.

9th. Copious crop of sudamina, but belly soft and not distended. Complete remission; pulse quiet; skin soft and moist; drowsiness diminished. Although there was no remission of the fever until yesterday morning, but sustained heat

and great dulness, it is interesting to note the slow pulse and herpes labialis at all times since admission. Repeat quinia.

10th. Fever this morning, mild. Repeat quinia.

13th. No ascertained remission since last note. Skin dry and heated, but pulse still slow (75 to 85). Is drowsy constantly, but intelligent; and does not complain of headache or pain elsewhere. Sudamina present in abundance, but no red spot has appeared. Abdomen not distended. Bowels not moved for five days (except a meagre discharge after enema on the ninth), until a teaspoonful of castor oil produced two copious evacuations two hours and a half after its administration this morning. For two days he has taken four fluidounces of whiskey daily, in the form of milk punch. On the ninth the dose of quinia was reduced to gr. viij, and this amount was given yesterday and ordered a third time to-day. Beef tea and acid continued.

14th. Pulse sixty-eight. Face cool; small drops of perspiration on the forehead. Arms and body dry and slightly heated. Animation better; less disposed to sleep; complains of weakness, but no pain; tongue whitish, less coated. No discharge from bowels. Treatment continued. *Note.* Pupils always large, but respond readily to light.

16th. Bowels moved once yesterday, discharge mushy and of good color. Yesterday morning and again early to-day the face was moist; at twelve skin everywhere dry.

17th. Sweating again early this morning. Temperature 98°. Pulse 72. Respirations 18. On the 15th and 16th, he took gr. vj of quinia; to-day gr. iv. Convalescent. Stop muriatic acid and give Mist. Gentianæ et Ferri, f℥ij, t. d.

Discharged August 30th. Sick between four and five weeks.

The three following records are presented as possessing features of great interest both in pathology and therapeutics, and as indicating the extreme character of many of the cases upon which my observations have been made. Mere verbal statements, however, be they never so accurate, can give but an imperfect picture of such illness. The

strange derangements of the cerebral functions, and the almost total suspension of animal life, not less than the rapid destruction of physical substance and force, are difficult to describe, but cannot be overstated; for there can exist but few steps between them and death.

CASE XIII.—*Remittent Fever. Malignant Type; Cerebral symptoms marked.*

Francis Perry, æt. 27, admitted to the Pennsylvania Hospital October 8th, 1866, at 4½ P.M. Sailor. Fifteen days from Savannah. Taken ill on the first day out. No distinct chill: fever, headache, nausea, and vomiting; remissions in the morning, exacerbations about three o'clock in the afternoon, followed by sweating in the evening and night. Bowels quiet. No epistaxis. No herpes. Constant, severe, "contusive" pains in back, neck and limbs. On admission [4½ P.M.], in a chill, the first positive one. Tongue cool and dry; *breath* cool, voice indistinct, face bluish, point of nose cold; skin of body hot and dry, complains of chilliness, and shakes. Responses slow but correct. Pulse 118. Respiration too irregular to count. Temperature 102¾°. Ordered: Cover warmly in bed and apply heat to feet.

8 P.M. Febrile reaction at 7.30; is now sweating profusely; skin very hot. Pulse 140. Respiration 24. Temperature 105°. Absolutely stupid and unintelligent. Eyes much injected and very watery. Head retracted; breathes through the mouth; tongue hot and dry; sordes on gums. Ordered: Quinine Sulph., gr. xxiv.

October 9th. Very thin and weak. Face dusky, eyes dirty red, injected, heavy, pupils of normal size; expression and manner apathetic, but is no longer entirely oblivious; still breathes through the mouth only; tongue horny except at edges, not heavily coated; abdomen rather full, resonant, no eruption; bowels sluggish. Decided tendency to retraction of the head and rigidity of cervical muscles. At present no cough or vomiting. Slept last night intermittently. No delirium or jactitation. Spleen enlarged a little upward. Blood contains three times normal number of white cor-

puscles. There is an ill-conditioned abscess of several days' duration upon the hand. Ordered: Milk punch and beef tea, of each two fluid ounces every two hours.

℞. Vini Albi, f℥viij per diem. Repeat Quinia.

7 P.M. Pulse 100. Respiration 35. Temperature 101°. Eye clearer; no flush on face; intelligence good; skin moist; feels his great weakness; bowels not opened to-day; has had no chill this afternoon nor increase of fever; passed urine freely.

10th. Pulse 88. Respiration 20. Temperature 101¼°. Abdomen less full; line of hepatic percussion-dulness rather higher than normal, and a half to one inch below the edge of ribs. Epistaxis during the night; no change in sordes and horny tongue; head retracted persistently. Ordered: Repeat Quinia; four dry cups to back of neck. Continue stimulus.

11th. Better. Tongue moist, except in the centre, and sordes disappearing. The sore upon his hand has assumed a more healthy appearance; is granulating. Moves his head forward without pain; cervical muscles relaxed. Pulse, 76; respiration, 20; temperature, 101½°. Ordered: Repeat Quinia. Continue stimulus.

Evening: Increase of fever and mental hebetude, followed by sweating.

12th. Pulse 60. Respiration 20. Continued improvement. Bowels comfortably moved last night. Ordered: Reduce Quinia to gr. xvj. Continue stimulus.

8 P.M. Slight febrile exacerbation this afternoon, followed by profuse sweating. Does not appear to have perfect control over his bladder. Tongue still disposed to be dry in the centre.

From this time the convalescence was uninterrupted, and the remedies were gradually diminished in quantity.

CASE XIV.—*Pernicious Fever. Hypodermic Use of Quinia. Recovery Rapid.*

Noah Davidson, æt. 20; sailor. Admitted September 12, 1865. He left Philadelphia August 1, 1865, and went to Savannah; left that city September 3, 1865; reached Phila-

delphia again September 11. Was taken ill on the way up, September 5; had one chill; afterward continued fever with remissions. Bowels loose. Frequent vomiting and anorexia. No epistaxis. Skin very dusky. He asserts that it became so after an attack of yellow fever in Cuba, three years ago. Has been confined to bed for three days, as he struggled to keep up for the first four. On admission his symptoms were hebetude and restlessness; tongue very dry; face congested; capillary circulation torpid; bowels freely opened, large thin stools; frequent vomiting, especially provoked by quinia; pulse 120, very small; surface hot, but with tendency to be cold and shrivelled on extremities; voice feeble; spleen enlarged; abdomen large and tender, especially over liver; conjunctivæ yellowish.

September 13th. Frequent vomiting; tongue heavily coated; hebetude. Urine acid, sp. gr. 1023; chlorides very deficient; no albumen; reddish-yellow with heavy deposit.

14th. Expression better; surface still dark; tongue heavily coated, merely dryish; eyes cholæmic; skin sallow; pulse 92, more volume; bowels opened once, not very thin; vomiting rare; slept quite well; anorexia; great thirst; temperature in axilla (11 A.M.) 102°. Respirations somewhat sighing. Urine acid; chlorides deficient; no albumen, reddish-yellow.

16th. Slept quite well; nausea, but no vomiting. Bowels quiet. Tongue heavily furred. Pulse weak, 72 per minute. Considerable hebetude. Skin inclining to be cold and clammy on arms and legs. Anorexia.

18th. Has very rapidly convalesced, and leaves the hospital, but is not in fit condition to travel. Urine acid; no albumen; chlorides still very deficient; color yellow.

*Treatment.*—September 12th, 1865, 6 P.M. On admission, Whiskey, f℥j, and, if possible, Quiniæ Sulph., gr. xl.

13th. Quiniæ Sulph., gr. xl; gr. xx of which were given hypodermically. Mustard to stomach. Tr. Opii, gtt. lx, per anum. Pil. Hydrarg., gr. iij. Liq. Ferri Peracetatis (Basham's mixture), f℥ss., q. q. h.

14th. Quiniæ Sulph., gr. xij, by mouth; gr. xviij, hypodermically.

15th. Quiniæ Sulph., gr. xxiv, by mouth. 16th, gr. xviij. 17th, gr. xij. 18th, gr. ix.

No irritation was produced in this case by the hypodermic use of the quinine in concentrated solution.

CASE XV.—*Pernicious Remittent Fever. History of Debauch. Collapse. Slow Reaction. Gradual Recovery. Hypodermic Use of Quinia.*

Thomas Waygood, native of England, æt. 44. Admitted to the Pennsylvania Hospital September 13, 1865. First enlisted in the army December 10, 1861, and served twenty months; always in good health. Re-enlisted March 6, 1865, in Tenth Corps. Has been in North Carolina, at Raleigh and Halifax; last at Weldon, for two weeks. Left there August 26th. Reached Camp Cadwalader, Philadelphia, September 2d. Drank very freely on the way to this city, and for two or three days after arriving. First felt sick September 5th. Has not had any regular chill; but great prostration, with irregular exacerbations and remissions; sweats once or twice; constant vomiting; considerable purging.

On admission: Surface was cold and clammy; skin on extremities shrivelled; tongue dryish, moderately coated; skin sallow; eyes icterode. Belly tympanitic. No eruption. Liver and spleen enlarged and tender. Constant vomiting, provoked by anything swallowed. One liquid stool soon after admission. Considerable deafness. Profound prostration. Pupils small; vision dim; expression of eyes wild. Wandering delirium.

14th. Profound prostration. Tongue dryish, coated. Pulse 95, very small. Pupils contracted. No actual delirium, but stupor; quite deaf; roused with difficulty; memory weak; constant vomiting of thin yellowish fluid. Bowels quiet. Urine retained.

15th. A very slight reaction occurred last evening. This morning his skin is less cold and damp. Pulse 100, still very weak. Less vomiting. Urine still retained, not albuminous, chlorides absent.

16th. Decided reaction. Skin warm and supple. Vomit-

ing somewhat checked; a little lime-water and milk being now retained. Pulse 90, very weak. Bowels opened freely.

17th. Vomiting has ceased. Tongue less dry. Some appetite. Pulse 85, stronger. Hearing better, and sight less dim. Bowels regular.

18th. Stomach bears Liebig's soup, milk punch, and quinia without vomiting. He is still very weak, but has a good appetite. Warmth of surface normal. Tongue moist and cleaning. Hearing and sight much better.

20th. Rapidly improving; still pale and weak; marked redness at the seat of several hypodermic injections. Urine acid, sp. gr. 1013, no albumen, chlorides slightly deficient, color reddish-yellow.

22d. Tumefaction of glands in left groin. Slight febrile disturbance.

26th. Lanced small abscess in right and left groin, over seat of injections. Color improving. Still very weak. Urine acid, sp. gr. 1016.

October 9th. A few days after last note the incision in his right groin was extended, and the wounds are now doing well. Steadily improving in strength and appearance.

*Treatment.*—September 13th (day of admission).—Quinia being rejected both by stomach and rectum, gr. x were given hypodermically at 4, 5, 6, and 7 P. M. [The solution was of strength of gr. xx to f℥j of water, with enough strong sulphuric acid (gtt. ij ad iij) to dissolve it.] As much beef tea and whiskey as the stomach would bear,—scarcely any. Tr. Opii, gtt. lxxv, per anum. Blister over stomach; dressed afterward with morph. acet., gr. ½.

14th. Hypodermic injections of quiniæ sulph., gr. x, at 10, 11, and 12. External heat and frictions. Enemata of milk punch, f℥iij, and yolk of one egg every second hour.

15th. Hypodermic injections of quiniæ sulph., gr. x, at 9 and 10. Epigastric blister, dressed with morph. acet., gr. ½. Nutritious enemata continued.

16th. Hypodermic injection, gr. x, at 9 A. M. The same on the 17th.

18th. Stomach bears quinia; gr. iij were given at 9 and

10. Nutritive enemata given only every four hours, since he is able to take a considerable amount of milk punch and beef tea by the mouth.

20th. Emp. ammoniaci cum hydrarg. applied over seat of one of the hypodermic injections on right pectoral muscle. Lead-water and laudanum applied over groin, as the superficial lymphatics are considerably enlarged, especially on the left side, where extensive suppuration, with some sloughing, has taken place. The other points of irritation were trusted alone. ℞. Tr. Ferri Chloridi, gtt. xx, q. q. h. This was well borne by the stomach. Spt. Frumenti, f℥xij per diem. Quiniæ Sulph., gr. vj per diem.

October 9th. Continues to take iron. Stimulants have been steadily diminished, and he now does not take any. The points of suppuration are healing kindly as his nutrition improves. Only three of the injections have caused suppuration; considerable irritation followed all the others, with some little tumefaction, but gradually subsided. That in the left groin is the only one where the suppuration has been at all deep and extensive; it laid bare the inguinal lymphatics. He still takes quiniæ sulph., gr. vj, each day. Is sitting up, much improved in appearance and strength.

He soon afterwards left the hospital, almost entirely recovered.

*Remarks upon Treatment.*—This paper is based upon one hundred and seventy-six cases of malarial disease, either remittent or intermittent fever, or the cachexia which follows either of these types.

Of the whole number six died. Of the six, two were moribund when brought to the Hospital, one dying in less than two hours, and the other in twenty hours. One recovered from the malarial attack, and died, some time afterwards, of dysentery contracted in the ward. One was admitted six days after the onset of the disease, extremely exhausted, and died in two days. A fifth died in six days, having been much exposed and neglected before admission; and the sixth died of acute tuberculosis, upon which the malarial disease had been engrafted, or which, from a latent condition, had

been rendered active by the miasmatic poison. All the rest recovered, making one hundred and seventy recoveries against six deaths. That many of the cases which recovered were of a dangerous form is proved by the history of some given towards the close of this paper.

The treatment pursued was of a very simple kind, and to this I wish particularly to call attention. Three points were especially insisted upon: rest, a sustaining regimen, with stimulants whenever debility was marked, and the use of quinia from the very first day. The patients were compelled to lie abed so long as the fever presented the remittent type, and also during the paroxysms of intermittent fever. In the intermittent cases, when the periodical return proved at all obstinate, the patient was kept in bed on his sick day, until some hours after the period for the attack had passed by. On the well day he was allowed to be about the ward. Those also who came in suffering at all severely from the anæmia and cachexia of the chronic form were kept in bed several days, until a decided improvement in the sanguification showed some return of strength and health. I believe that this simple measure of *absolute repose* in a good bed is of great importance in all severe cases, in all which fail to yield readily to quinia, and in all the cachectic conditions.

The regimen directed in all the remittent cases was that generally used in typhoid fever. It consisted of liquid food, such as milk, beef or chicken tea, and sometimes bread. In severe remittent forms, where there was marked debility, milk punch and beef tea were given every four or two hours, usually in the quantity of two or three fluid ounces at a time. In those who were not very weak the milk punch was given three or four times a day, and beef tea with bread at dinner, and bread and milk morning and evening.

The quinia was given in solution nearly always. The only exception to this rule was when the bitter taste caused vomiting; in such cases it was administered in pill or by the rectum. The regular dose was four grains, repeated every hour or every two hours, until sixteen or twenty grains had been taken. These doses were always continued for three

or four days, or until the fever was broken up, or the paroxysms arrested; after which one or two doses daily were given. In two cases the irritability of the stomach was so great that the quinia was rejected whenever it was given, and it was used by the hypodermic method. In one of these no ill effects resulted from this mode of use, but in the other quite large abscesses with sloughs were produced. Fortunately the abscesses all healed kindly, and the patient left the house well. But the inflammation was so severe and extensive that I should be unwilling to use such a concentrated solution again. The preparation employed contained twenty grains to the drachm of water, the quinia being dissolved by the addition of two to three drops of strong sulphuric acid. Half of that quantity was given at once. Should I have occasion to use it again I should employ a solution of only half the strength, expecting to derive sufficient effect from five instead of ten grains of this drug.

As soon as the periodic element was throughly subdued, five grains of the ammonio-citrate of iron dissolved in a tablespoonful of a mixture of fluid extract of gentian, a little lavender compound and water, were administered three times a day, until the blood had regained its normal color, and the strength of the patient was well restored.

None of the cases were bled. The only bloodletting employed was the abstraction of from four to six ounces from the back of the neck, in a few cases.

Mercury was scarcely employed at all. A few blue pills were given, when the bowels were rigid, and the skin very sallow, but certainly not more than twenty blue pills were used in all the cases, and calomel was proscribed as unnecessary, and likely to be injurious by its debilitating effect.

No drastic doses of cathartics were allowed. Rhubarb in moderate doses, a Seidlitz powder, or small doses of Rochelle salts were resorted to when the bowels were decidedly torpid, but, if the patient had a spontaneous evacuation every day or two, the bowels were left undisturbed.

I desire to call particular attention to the very small amount of mercury used in these cases. I believe that the old

American system of giving calomel and jalap, or calomel in ten or twenty grain doses, as a cathartic, or in one or two grain doses, every two or three hours, as a cholagogue or alterative, is positively dangerous from the debility which they cause, and from the gastric and intestinal irritation which they sometimes set up. To say the least, they are unnecessary, and any one who has seen the gastric distress, intestinal irritation, or the constitutional poisoning which mercury not unfrequently induces, will be glad to know that he may, with a good conscience, dispense with its use in so severe and dangerous a disease as this of malarial fever often is. To know that 176 cases of malarial disease, many of them very severe in their type, were treated almost without mercury, with only six deaths, is surely proof enough that this drug is not essential. And when it is recollected that of the six deaths, one occurred in an hour and a half, and another in twenty hours after admission, one of dysentery after recovery from the fever, and one of acute tuberculosis, leaving only two deaths in 172 cases fairly ascribable to the malarial disease after proper treatment, it must be plain that mercury, except in very small doses, may be safely dispensed with.

# ON ACUPRESSURE.

By ADDINELL HEWSON, M.D.,

ONE OF THE SURGEONS TO THE HOSPITAL.

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Acupressure, as a substitute for the ligature in arresting surgical hemorrhage, originally proposed by Professor James Y. Simpson, in 1859, is steadily gaining advocates, and will, I believe, be eventually preferred by those who may give it a thorough trial. I have now had opportunities of testing it on all the large vessels of the extremities, and with me its employment has always been pre-eminently satisfactory. In parts where the ligature has often proved so unsatisfactory as to make some more effectual means of permanently closing the bleeding orifice a great desideratum, as in the axillary artery, palmar, or plantar arches, or in other parts where the vessels give off branches close above the point at which it is desirable to effect the obliteration of the calibre, this method has been found by me all that could be wished for.

To those who have thoroughly tried this means of arresting hemorrhage, and have enjoyed its advantages in the facility of its application and in the security eventually experienced in its employment, nothing is needed to effect an interest in all that appertains to the subject. But for a large majority of the profession, who have been taught and have become wedded to the notion that the ligature is the only safe and efficient means of defence against hemorrhage, much time and patience must necessarily be required to

overcome their prejudices. To one educated in the belief that, to be secure from occurrence of hemorrhage after major operations, it is essential that the internal and middle coats of all the severed arteries should be completely divided by ligatures, tied so tight as to force the external or cellular coat in between these divided structures, and there secure its union by adhesive inflammation,—it can readily be seen that the idea must prove a startling one to propose to rely for the obliteration of such a vessel as the femoral, brachial, or even one of less size, on the pressure, and that not very direct, of a pin, for so short a period as twenty-four or forty-eight hours. Most persons who have given the subject any thought have come to the conclusion that this pressure has only the effect of closing the vessel merely long enough for a firm coagulum to form, and that the latter is therefore the only protection our patients have from bleeding to death under such treatment. Now, this I believe to be altogether a gratuitous assumption. Prof. Simpson does not anywhere, that I have been able to discover, claim that this is the effect or *modus operandi* of acupressure. In his latest publication on the subject,* he says:

"Before including any arteries in the human subject by acupressure, I satisfied myself by seeing the results of metallic ligatures applied so as merely to close tubes of arteries, without mechanically injuring or cutting them, that the mere apposition of the inner walls of the artery which the acupressure needle induces, is quite sufficient, as a hæmostatic means for the largest arteries in the human body. And I further, found that by acupressure alone I could close such a very large vessel as the carotid artery in the horse."

He further remarks, that "no sufficiently extensive series of experiments upon the lower animals, or of observations on the subject, has yet been collected together to show the whole pathological mechanism by which arteries are closed when acupressure is used."—*Appendix*, pp. 535–6.

* Acupressure. A New Method of Arresting Surgical Hemorrhage, and of Accelerating the Healing of Wounds. By James Y. Simpson, M.D., F.R.S.E. Edinburgh, 1864.

In this quotation there is, in the first part, a simple statement of facts,—facts of his own observation,—that it is not necessary to injure or cut the coats of the vessels by the ligature to secure their obliteration, and "that the mere apposition of the inner walls" "is quite sufficient, as a hæmostatic means," which are certainly not to be distorted into an admission that the coagulum formed in the vessels above the point of pressure, is the only obstacle to the occurrence of hemorrhage, or that there are no structural changes produced in the vessels by means of such pressure. On the contrary, the concluding sentence of the quotation contains a distinct declaration of imperfect knowledge of the pathological mechanism of this mode of hematosis, and implies a desire for more complete information before a theory or idea can be formed of the manner in which it produces the desired result.

Now, singular as the fact is, that this objection, which is so universally advanced by surgeons unwilling *to try* the process, is not only without foundation in anything that has been stated by its projector, but, having had its origin in the brains of those who are sworn champions of the ligature, it is in direct contravention of the facts on which the *modus operandi* and efficiency of the ligature in preventing hemorrhage is based.

In the experiments and observations of Dr. Jones,* to whom we are indebted for our present knowledge of the manner in which the ligature acts, it is clearly demonstrated that nature, even in her *unaided* efforts, does not rely on the coagulum formed in the interior of arteries—that she only employs it as *temporary* means, and then even always as secondary to that formed on the exterior and divided surface of the vessel.

In instances where the vessel has been cut across not more than a quarter of an inch beyond where it gives off a branch,

* A Treatise on the Process Employed by Nature in Suppressing the Hemorrhage from Divided and Punctured Arteries and on the Ligature, &c., by I. F. D. Jones, M.D.

she forms no internal coagulum at all, but arrests the hemorrhage if the state of the wound favors the formation of an external coagulum. Nay, more than this; some of the observations cited by him demonstrate that neither an internal or external coagulum is *absolutely essential, for any mechanical means* (the interference of art) which will prevent the flowing away of the life-blood long enough to allow nature to effect her work, will answer in place of either or both of these temporary means combined; for the real means by which nature secures the *permanent* arrestation of hemorrhage, "is an effusion of coagulating lymph within its (the artery's) canal, between its tunics and in the cellular substance surrounding it." (p. 57.) This material, which is derived, as he states, from the *vasa vasorum*, is so rapidly effused after the infliction of the injury to the vessel, according to his experiments, as to be capable of accomplishing its work in a very short space of time.

Its extent will depend upon the apposition of the divided edges of the vessel. "When," as he says (p. 63), "the divided artery has been left entirely to itself, there is such a quantity of lymph effused that, although it is firmly united to the internal surface of the artery, it may be considered as a distinct substance; but if the cut edges of the extremity of the artery had been kept in contact with each other by pressure, they would have cicatrized, and no coagulum (of lymph) would have been formed—*i. e.*, coagulating lymph would not have been effused in such a quantity as to form a mass of a determinate figure."

In one of his experiments (No. IX), where, after dividing the femoral artery of a dog, and allowing the hemorrhage to arrest itself, and then killing the animal six hours later, this lymph was found formed in the vessel a little above its superior extremity.

In this cursory sketch which I have just given of the views held by the great author of the modern theory of the ligature as a hæmostatic—views which have stood uncontroverted for more than half a century—I do not wish it to be inferred that he underrated the value of the coagula, both

internal and external, which are formed; for, on the contrary, he demonstrates them as important parts in nature's unaided efforts, acting thus in place of the ligature, and ridicules Pouteau's idea of attempting to demonstrate the *natural* means by which hemorrhage is stopped—"from observations made on arteries many days and even *weeks after they had been divided*, and on which some *artificial means* had been applied to suppress the hemorrhage." "Thus he" (Pouteau), Dr. Jones remarks, "first informs us in a general way that, after amputations of arms, legs, and thighs, in which the flow of blood had been stopped by the ligature, *compression*, or caustic, he very seldom found any traces of a coagulum, and then gives a more particular account of four examinations in which he had been equally unsuccessful; they were made on the stump of an arm, eight days after amputation; of two legs, one ten days, the other three weeks after the operation; and finally of a thigh, four weeks after amputation. In all of these cases some artificial means had been used to suppress the hemorrhage; and yet these are" (he exclaims) "the principal instances and the periods of examination from which Mr. Pouteau undertook to write a 'Memoir on the means which Nature' (italicized) 'employs for the Suppression of Hemorrhage'" (pp. 14, 15).

This criticism on Pouteau contains, however, an admission by Dr. Jones which cannot be very acceptable to those who assume it as a fundamental principle established by him that in cases of arrestation of hemorrhage by *compression*, the only obstacle to the recurrence of the hemorrhage is the formation of coagula within and around the divided vessel. But it is not necessary for us to rely on such indirect evidence as this, to prove that this logical writer held views different from those his followers would wish us to believe, for he distinctly declares, that lymph is always exuded, and that very early even in cases of spontaneous arrestation of hemorrhage, and after describing the manner in which the coagulum forms after the ligation of an artery, he says, that "the formation of this coagulum is of little consequence; for soon after the application of the ligature the extremity of the artery begins

to inflame, and the wounded internal surface of its canal being kept in close contact by the ligature adheres and converts this portion of the artery into an impervious, and at first, slightly conical sac. It seems to be entirely owing to the *effusion of lymph by which this adhesion is effected*, that the coagulum of blood formed within the artery is sometimes found adhering by a small part of its base to the extremity of the artery. But whilst the adhesion of the internal parietes of the artery is being accomplished, a considerable quantity of lymph is effused between its coats and among the parts surrounding its extremity; so that in a very short time the extremity of the artery is enveloped in lymph and covered with a layer of it, just as we have seen the punctured artery to be. After a short time the ligature occasions ulceration of the part around which it is immediately applied; and acting as a tent, a small aperture is formed in the layer of lymph effused over the artery; through this aperture a small quantity of pus is discharged, as long as the ligature remains, and finally the ligature itself also escapes, and the little cavity which it has occasioned granulates and fills up, and the external wound heals in the usual manner, leaving a considerable thickening and induration of the cellular membrane, extending a little beyond the extremity of the artery. But since a certain degree of ulceration and formation of pus appear to be the necessary effect of the ligature, and this ulceration takes place as near as possible to a newly cicatrized part, and as it is a well-known fact that such parts very readily ulcerate, it is obvious that every possible means should be employed to prevent the extension of this ulcerative process." (pp. 160–61.)

It now seems to me that it is not necessary to produce further evidence to satisfy even the most captious, that this great expounder of nature's laws and man's art in arresting hemorrhage would not, if he were living, sustain the objections which his professed followers urge against acupressure. It is true, that in his Chapter (V), "On the improper form and application of the ligature as tending to produce secondary hemorrhage," he lays great stress on the necessity

of the ligature being round and smooth, and tied with such tightness as to *completely* and *evenly* divide the internal and middle coats of the artery, and says—this "keeps their cut surfaces in contact and affords them an opportunity of uniting and cicatrizing, as other cut surfaces do by the adhesive inflammation." But in this chapter he remarks that "it appears highly improbable that a broad flat ligature should make such a wound in the internal and middle coats of an artery as is most favorable to adhesion, because it is scarcely possible to tie it smoothly around the artery, which is very likely to be thrown into folds, or to be puckered by it, and consequently to have an irregular, bruised wound made in its middle and internal coats. And even if it should make a proper wound, yet by covering a considerable space of the external surface of the artery, it may destroy the very vessels which pass on it in their way to the cut surfaces of the internal and middle coats, and thereby render them incapable of inflaming, nor does it appear that anastomosing branches can supply this defect, for if the branches which immediately supply the cut surfaces are bruised and compressed by the ligature, how is the blood from anastomosing branches to enter them? But admitting that such a ligature makes a proper wound, and that the wound unites, still it may cover that part of the external coat which is directly over the newly united part, and consequently, as soon as it has occasioned ulceration through the external coat, it will produce the same effect on the newly united parts, and of course secondary hemorrhage."

It is quite evident that the champions of the ligature in quoting Jones against acupressure, are guilty of the same offence which Jones complained of in Pouteau. They argue on the assumption that the process or *modus operandi* is the same in acupressure as in the ligature, whereas Professor Simpson, in the very first conception of the idea, started with the project to use a means of permanently closing bleeding orifices, which would *not* require the same actions on the part of nature,—those of inflammation and sloughing,—which are necessary for the removal of the ligature *after* it has ac-

complished its purpose as a hæmostatic, but which, even Dr. Jones admits, it is desirable to reduce to a minimum degree, as an evil, unavoidably attendant on the use of the ligature. Dr. Jones admits that *compression* can permanently arrest hemorrhage, and when it has been successfully used *lymph* is found gluing up the divided edges and contracting the calibre of the arteries, as is demonstrated in all his experiments to show *nature's mode* of accomplishing the purpose. He did not know, possibly, that firm metallic substances could be thrust into the flesh and produce little or no irritation, and could so furnish sufficient pressure to stop the bleeding from the cut edge of the largest vessels, but he *did know* that when the bleeding ceased, there was immediately thrown out lymph to permanently close the cut edges, and that this, in the case of the division of the femoral artery of a dog, was effected within six hours (see experiment referred to on p. 130) after the infliction of the wound. Now, Sir James Y. Simpson knew that metallic substances could be used in the flesh without producing any amount of irritation, and had satisfied himself that so large an artery as the carotid of the horse could be controlled by a pin, and having given the suggestion to the world to use such a measure as a hæmostatic, with better chances of recovery for injured persons than they would have with the ligature, he has left the further development of the subject to others. Really, those who have scoffed at the idea of such an innovation being an improvement in surgery, and of its being introduced by *one* who does not claim to be a practical surgeon, but who is a mere theorizer, have convicted themselves of *theorizing*, and that too, on most fallacious premises.

Having thus shown that the opponents of acupressure cannot sustain themselves even by theory, or by the high authority of Dr. Jones, which they have brought forward, I now propose to furnish some facts in relation to its *pathological mechanism*, which, having come under my notice, have contributed so largely to my own faith in the procedure, that I hope their publication may be of service to many doubters and unbelievers.

The first case I shall relate was of a small, slender, pock-marked Englishman, aged 28 years, who was brought to the Pennsylvania Hospital on the 13th day of December, 1864, on account of a severe injury of the left upper extremity produced by machinery in a cotton mill at Kaighn's Point, New Jersey (some three miles from our institution), where he was employed as an operative. The hand itself was completely pulpified, and the forearm so extensively lacerated as scarcely to admit of a circular amputation below the tubercle of the radius. The patient when received into the institution had sufficiently recovered from shock to allow of the operation, but his condition otherwise was not favorable. He was pale, sallow, had an enlarged spleen and liver, and acknowledged that he had been suffering with ague all through the autumn previous. Just three hours and a half after the occurrence of the accident he was etherized and had the limb removed. The tourniquet was used to control the circulation, and the form of operation adopted was the circular, with division of the muscles on two different planes. The superficial set close to the incision through the integuments, the deeper an inch higher up, so as to admit of sawing off the bones just below the attachment of the biceps to the radius. Two long gilt pins were all that were required to control the hemorrhage. One was passed through the anterior cuff from the radial side under the radial artery, and its point brought out in front of the ulna (Simpson's first method), the other was passed in the posterior cuff from the ulnar side, in front of the ulnar and interosseous, and pushed on so as to bury its point behind the radius (Simpson's second method). The stump, thoroughly cleansed of all coagula, was carefully closed four hours after the operation by means of leaden stitches; no other dressing was used. The patient was at once ordered a vigorous diet and given tinct. ferri. chlor., gtt. xxx, thrice daily. On the following day his urine was found to be of a sp. gr. of 1026, and loaded with the chlorides and urea. His general condition was bad; about noon he had a chill followed by profuse sweating. This chill re-

curred the next day, and his urine, still of the same sp. gr., was found loaded with phosphates, which deposited in large quantities on cooling. From this day he rapidly grew worse, developing unmistakable signs of pleuro-pneumonia and abscesses in both lungs. He sank on the seventh day after the operation. The acupressure pins were removed on the third day. The stump itself was always dry.

At the autopsy, made four hours after death, the lungs were found studded with abscesses in every stage of development, from points of intense congestion to complete disintegration of structure. But few of the patches had, however, advanced to the latter stage. There was but a small amount of limpid serum effused in either pleural cavity. There were well-marked recent pleuritic adhesions on the left side. Heart apparently and microscopically healthy. No effusion in abdominal cavity. Liver weighed 5lbs. 3oz., free from abscesses; very friable, and capsule easily detached. Microscope revealed fatty degenerations. All the cells examined contained large quantities of granular matter, obliterating the nuclei in about half the substance examined. Fat globules were everywhere evident, both free and within the cell-walls. The kidneys showed congestion and incipient fatty disintegration. Cells were large; full of granular matter, with some free and extra-cellular fat globules. The Malpighian bodies and capillaries were everywhere congested. The latter contained in some instances well-defined emboli. The degeneration of the kidneys, though very positive, was not sufficient to prevent the free action of these organs, as was shown by the large amount excreted daily by the patient before his death. The spleen was apparently quadruple its natural size; it weighed 1lb. 4oz.; was solid and firm. Microscope showed hyperæmia with some of the pigmentary matter of Frerichs.

For the very accurate and minute details of this case I am indebted to my friend Dr. Edward Rhoads, then the Resident in my wards, whose zeal and industry have placed me under many similar obligations whilst pursuing my observations in the Pennsylvania Hospital. The minuteness of account

which I have here given might possibly have been omitted without detriment to the case or the point which I wish to illustrate, but as it furnishes evidence of the thoroughness with which the whole matter was studied, I have deemed it advisable to publish it as it is. This patient having showed unmistakable signs of miasmatic poisoning before the operation, and having died, as was very evident, of pyæmia, the condition of the bloodvessels which had been subjected to acupressure was of very special interest, particularly as the points of pressure were evidently so near the division of the main vessels into branches as to deprive the patient, in a measure, of all security to be derived from any internal coagulum. The aplastic condition of the patient's blood also made the case a severe test of the procedure. I therefore examined the vessels which had been so treated with very special interest.

The accompanying wood-cut, made from a photograph of the specimens enlarged by the solar camera, shows that the pin used on the radial not only closed that vessel but two of its branches (anterior recurrent and a muscular branch), and that used on the ulnar not only closed similar branches, but also the interosseous with its first branch; so that it can be readily seen that these two pins accomplished what would have required eight ligatures as they are usually employed. Then, as can also be seen from the cut, the points of pressure were considerably above the cut ends of the vessels, so that little or no influence could be attributed to the *contraction* and *retraction* of the divided ends of the inner coats; for (as can be seen in the ulnar, which has been laid open), there were no coagula in the vessels beyond the point of pressure, on which such actions could have any influence. On making this section of the ulnar artery we found the opposite surfaces of the internal coat, immediately under the point of pressure, distinctly glued together by lymph, and a most minute examination could not reveal any laceration of the surface of the lining membrane. But what struck us most forcibly was the extent of exudation which had taken place beneath the internal coat, between it and the middle coat,

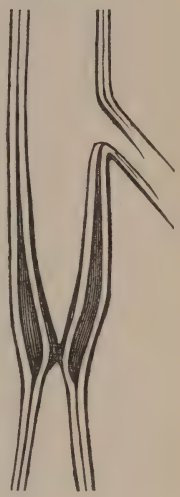
and even outside the latter. This can be distinctly seen even now in the photograph made after the specimen has been

Fig. 15.

Fig. 15 represents the specimen (magnified two diameters) of the arteries of the forearm in which acupressure was used. The shorter of the two main branches is the radial, and shows by the dark shadowing beyond its division the points at which it and its branches were compressed by the pin. The longer is the ulnar, and has been laid open so as to show the full extent of its internal coagulum and the amount and character of the thickening which has taken place in its coats. This display has been made by a cut on the ulnar side of this vessel, extending from its extreme end across its point of obliteration, and between its two recurrent branches. This cut was made to penetrate through all the coats everywhere except at the point of obliteration, where the internal coats were left intact, so as not to disturb the adhesions. The cut so made has been gaped open by drawing the upper segment of the vessel in which the anterior recurrent comes off over to the radial side. This has produced a distortion of the natural relation of the various branches, and in order that the interosseous and its branches, which were compressed by the same pin, might be seen in the photograph, they were drawn over to the ulnar side.

nearly three years in alcohol. This thickening extended nearly half an inch up the vessel (diminishing gradually up) to the first branch. An idea can be best formed of it from the accompanying diagram, where the whole effect can be seen at a glance. The mechanical obstruction which this condition presented seemed to us most satisfactory; for, as can be seen by the wood-cut, this was not a mere contraction of the muscular coat from the proximity of a foreign body which had excited the irritability of that structure, but an absolute increase of thickness; not a mere passive condensation of tissue through absence of distending force, but a positive vital activity. The microscope showed us that the cellular elements of the tissues here were undergoing rapid proliferation, leaving no doubt in our minds as to the character of the action going on. Beyond the point of pressure there was evidently shrivelling and atrophy of tissue.

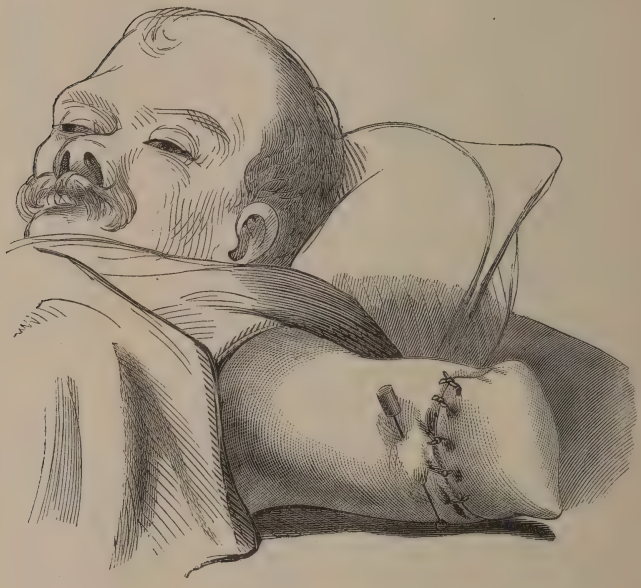
Fig. 16.



The progress of these changes can be demonstrated by another specimen, which I had the good fortune to secure a short time afterwards. It is from a patient who died in the Pennsylvania Hospital on the twenty-fourth day after undergoing an amputation of the left arm for a gunshot wound, the result of firing a salute whilst in a state of maudlin drunkenness. This man was an habitually hard drinker; had been in the army; and presented a fair case of chronic alcoholic poisoning. He was 40 years old, and all his large vessels showed distinct traces of ossific degeneration. The amputation, a Teale of the lower third of the arm, was performed by me in the night, within two hours of the occurrence of the accident, and but one pin was used, applied to the brachial, to control the hemorrhage. A number of muscular branches were secured by serres-fines, which were left on till the following morning, at 7½ o'clock, when they were removed, without any recurrence of bleeding. The stump

was then closed by means of metallic (leaden) stitches, and left uncovered. The accompanying wood-cut, taken from a photograph, shows the appearance it presented on the second day, and before the removal of the pin, which was accomplished fifty-two hours after its insertion. The extent of tissue embraced by the pin can be well seen in Fig. 17. No

Fig. 17.



hemorrhage, or even oozing, followed its removal. The patient, however, did not do well. He manifested symptoms of acute mania à potu the evening following the removal of the acupressure pin, and, becoming wildly delirious, it was necessary to restrain him in a jacket. His stump suffered severely from the rough usage he gave it, but no hemorrhage occurred. The long flap sloughed quite extensively; and the poor fellow was only relieved of his delirium to pass into a pyæmic condition, in which he died on the twenty-fourth day. I was not present at the autopsy. The ordinary le-

sions in such cases, of multiple abscesses in the lungs, &c., were reported. The brachial artery, which was of special interest to me, was saved for my inspection. Fig. 18, from a photograph, shows how completely the vessel had been closed. The pin appears to have compressed the vessel at the point of its division. The adhesion of the cut surface of both the internal and middle coats was firm and complete. The ossified condition of the coats had evidently favored the peculiar bulbous form which the vessel presents just above the point of compression. In this specimen, however, the same thickening of the coats and their connective tissue, the same union of the surfaces held in contact by the pin, are to be observed, and thus the same obstacles offered to the occurrence of hemorrhage as were found in the first case. At the time of the operation I felt that this case would furnish a severe test of acupressure. The result was not only encouraging, but most gratifying; and the post-mortem examination showed us a condition of things which certainly seems to give acupressure advantages over the ligature in cases where there is disease in the coats of the vessels. No one, on examining the vessel in this case, could have

Fig. 18.

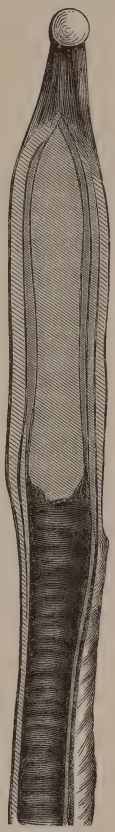


Fig. 18 represents the brachial artery (magnified two diameters) on which acupressure was used. This specimen was made by cutting the vessel in two from one end to the other, and shows very distinctly the thickening of the various coats, and the manner in which the divided ends of the middle and internal have been united. The specimen was suspended, for the purpose of taking the photograph, by a pin, which penetrated the external coat only. Hence, the true condition of this coat cannot be appreciated in the figure.

doubted that, had the ligature been employed, there would certainly have been secondary hemorrhage within a short time after the operation. It was so brittle that the ligature would have certainly cut itself through immediately on being tied as tightly as we usually tie it. Indeed, the analogy which exists between what was observed in the first case here reported and what has been described by the most astute pathologist of the present day (Virchow), as occurring in the early stage of atheroma and ossification of arteries, shows that acupressure must possess decided advantages over the ligature in such cases. He describes the process thus:

"The enlargement which the part undergoes in consequence of the process, and which we call sclerosis, depends upon this: the cellular elements of the coat increase in size, and a multiplication of their nuclei takes place, so that spaces are not unfrequently found in which whole heaps of nuclei are lying. This is the mode in which the process sets in. In many cases division occurs in the cells and a great number of young cells are met with. These afterwards become the seat of the fatty degeneration, and then really perish. Thus we have here an active process, which really produces new tissues, but then hurries on to destruction in consequence of its own development. But one who knows that the fatty degeneration is here only a termination, and that the process is really a formative one, inasmuch as it begins with a proliferation, he can readily imagine the possibility of another termination, namely, ossification."*

The early stage of this process is precisely what we have observed in the arteries subjected to acupressure, and is really the same as occurs in the first stages of all instances of local irritation, namely, *increased formative action.* When such irritation is of a high grade such a stage is of very short duration, and passes to one of a destructive or degenerative character, to which it may be very essentially aided by the previous tendency of the structures involved. The

* Virchow's Cellular Pathology. Amer. edition. Page 403.

same destruction may be hastened by the continued presence of the irritant. This process when excited by acupressure seems, where the pin has not been left in too long, to persist in its active or formative stage; for even in the case of the poor drunkard it was evidently still active at the end of twenty-four days, although the arteries before the accident were all more or less in a state of fatty and ossific degeneration. We know that the ligature would destroy in such cases the effects of this active process in much less time, for a degenerative termination, *i. e.*, ulcerative disintegration of the parts embraced within its circle, is not only essential and unavoidable in its use, but occurs much earlier in diseased vessels than it otherwise would; whereas from this case it would seem that acupressure can, in extensive degeneration of the vessels, effect sufficient apposition of their walls to arrest the hemorrhage and provoke in them an active process of thickening and adhesion, at least sufficiently long or permanent to seal up their calibres.

These two pathological specimens certainly furnish most positive refutation of the theory that the security in acupressure is merely from the presence of an internal coagulum, an obstruction easily dislodged by the *vis a tergo* of the circulation after the removal of the pin. They show the exudation of lymph, which we all believe is necessary for the permanent closure of arteries, and present obstacles in the diminished calibre of the vessels which must require very great power in this force to overcome. But is this force very great after it has been diverted for any length of time into other channels? The sphygmograph will demonstrate to any one that it is rapidly destroyed under such circumstances, and I have noted the fact by my unaided senses in many instances where I have been watching for the disappearance of the pulsation in the vessel secured by the pin, on which I have relied as a better criterion than any fixed number of hours for the time to remove the pin. I have always then been struck with the rapidity with which this force diminishes in the acupressured vessel, and is at the same time increased in the first branches above, not involved in any way in the

operation. As, for instance, in amputation of the thigh above the middle, so as to involve the profunda as well as the femoral, I have frequently noticed increased force in the pulsation of the vessels in the groin, showing itself immediately after the operation, and increasing in an inverse ratio with the impulse transmitted along the obstructed vessels. I have observed the same thing in the vessels at the elbow joint after amputation of the forearm. But this is all in strict accordance with a well-known hydrostatic law, of which Mr. Wardrop availed himself in the operation for aneurism which bears his name, which is this,—that when the flow of fluid is stopped through one branch of a tube, its force is distributed through the other branches in a direct ratio with the squares of the diameters of those branches, and this having the effect of enlarging those branches in the case of arteries which are of a distensible nature, the force soon ceases to exert an influence on the obstructed point. Wardrop states he observed this dilatation of branches take place almost instantly after the ligation of the carotid in a child. It is in consequence of this diversion of the current that the coagulation takes place in the divided end of the vessel. The coagulation, where means have been used to arrest hemorrhage, is the effect of the cessation of the flow, and not the cause. This fact cannot be made too prominent in considering the action of, and security which we derive from, the use of various hæmostatic agents. When the hemorrhage ceases spontaneously it is another matter, the coagulum formed on the outside stops the flow; but the security in such cases is universally admitted not to be anything like what we have where some mechanical agent has been used, for nature is not so prone to set up exudative action as where there is such a source of provocation; and the coagulum softening and flowing away, then the current will return into the vessel because there is no obstacle, and secondary hemorrhage ensues.

In amputations, the diversion of the current of the blood must necessarily be chiefly to branches remote from the surfaces involved in the operation, for it is only in branches

which do not enter the wounded surfaces that there is not *some* more than natural obstruction offered to the free flow of the blood, hence it is that in amputation especially, this *vis a tergo* is very rapidly neutralized, and to a remote point from the cut surface, so that where arteries are involved in such operations close to where they are known to give off considerable branches, the fear of their influence in producing secondary hemorrhage is very much exaggerated, at least where acupressure has been employed. It may be otherwise when the ligature is used, especially in a case of well-marked dyscrasia, where the adhesion primarily produced is destroyed by the sloughing necessarily excited for the discharge of the ligature.

In operations like the Hunterian for aneurism, or in those for the removal of tumors involving large vessels, the influence which we have been considering is of much more moment. In such cases, if the artery is secured just beyond a branch which has not been in any way implicated, that branch will become dilated and the *vis a tergo* of the circulation will remain in full power so near the point at which we have attempted obstruction as to do mischief when the obstructing force is removed, and will certainly do it if adhesion has not become firm between the opposite walls at that point.

The Hunterian operation also furnishes one of the best demonstrations of the rapidity with which the collateral circulation is developed through this diversion of the *vis a tergo*, for the experience of every practical surgeon will remind him of the fact, that the pulsation in the tumor often recurs within forty-eight hours of the ligation of the artery in which the aneurism was formed, a circumstance explained by the rapid dilatation of collateral circulation and the development of branches from it into the aneurismal tumor itself. This discussion of the dread of secondary hemorrhage from the impulse of the circulation disturbing the obstruction produced by acupressure, naturally suggests the consideration of one of the advantages which I stated it possesses over the ligature, namely, in parts like the axilla,

palm, &c., where it is desirable to effect obliteration of the calibre of vessels close to points where branches come off. In such cases I am satisfied that acupressure offers decided advantages over the ligature, for in the first place, should the wound involve not only the main artery but a number of its branches, they can all, probably, be secured by a single pin. Then secondly, the pin can be removed before ulceration and consequent opening of the calibre of the vessel subjected to its influence takes place; and thirdly, if the pin should be removed too early, or too roughly, so as to disturb the lymph which is closing the orifice, and cause hemorrhage, it can be readily reintroduced, even at a point higher up, without disturbing the original wound.

The first two of these advantages were well demonstrated in a number of my cases. One of these was an amputation at the shoulder in a mulatto woman for necrosis of the humerus, the result of an extensive burn of the arm some two months previous. The form of amputation was that of Larrey, splitting the deltoid and capsule, disarticulating the os humeri, then sliding the knife down under the bone and dividing the tissues containing the axillary vessels. My assistant grasped the flap so formed behind the point where these vessels were cut across, and one pin inserted in it controlled all the bleeding orifices, for the anterior circumflex divided in the splitting of the deltoid and capsule was so small as to admit of being completely closed by a serre-fine. The patient lost scarcely an ounce of blood in the whole operation. The pin embraced not only the axillary artery but some of its branches, besides the axillary plexus and venæ comites. It was removed on the third day after, when the pulsation ceased to be felt on grasping its head. The extreme emaciation of this patient enabled me to recognize the rapid increase in the subscapular artery as the pulsation diminished in the axillary.

Those familiar with Larrey's procedure can appreciate my statement, that this case on the fourth day, that is, the day after the removal of the pin, presented the appearance as near what we might dream of as perfection in amputations.

The simple vertical line which results from this mode of amputation at the shoulder joint—without the presence of any irritant to delay the union of the flaps which formed it—certainly presented a most attractive appearance. The wound healed rapidly, but the patient died, as I have been informed, sixty days afterwards, of acute phthisis. Of this disease there were neither rational or physical signs at the time of the operation, or within three weeks of it, after which she ceased to be under my care. The exhaustive drain to which she had been subjected by the presence of the necrosed bone, and the dyscrasia which terminated her life so quickly after her recovery from the removal of the limb, certainly make this case as fair a demonstration of the security of acupressure when employed in the vicinity of numerous divisions of arterial trunks as could be wished for; they also furnish presumptive evidence against the notion that acupressure only does its work by producing coagulation. I have records of cases of wounds of the palmar and plantar arches also demonstrating these merits of acupressure, but their details are of but minor interest, and their numbers are not sufficient to give weight in any comparative estimate of the different modes of preventing hemorrhage. Indeed, I feel compelled to refrain at the present time from giving any further details of my experience with the view of making deductions from it; for although my three years of trial have furnished me experience in a great variety of cases, and have given results of the most favorable kind, still such data cannot be sufficient to determine the most important parts of the problem before us, namely, the advantages of this process to our patients, in reducing the risks to their lives and the time required for their convalescence. My results in both these respects have been so very satisfactory, that I feel that a more extended experience must alter them somewhat, especially in reference to the first point. My experience might be accepted as more accurate in regard to the second, the duration of convalescence in the successful cases; but the reduction which acupressure has effected here with me of nearly one-half the time, seems too great to be correct,

for this is the result of comparison of all my cases, since I have been using acupressure exclusively, with any similar number of cases of the same kind with the ligature, which have occurred in the Pennsylvania Hospital in the last fifteen years. One of my cases furnished such an extraordinary result in this respect, that I cannot refrain from alluding to it now. It was an amputation of the thigh, where the union seemed so firm and complete as to enable the patient to be up and about on the tenth day after the operation.

# STATISTICAL ACCOUNT

OF THE

# CASES OF AMPUTATION

PERFORMED AT THE PENNSYLVANIA HOSPITAL FROM JANUARY 1, 1850, TO JANUARY 1, 1860,

WITH A GENERAL SUMMARY OF THE MORTALITY FOLLOWING THIS OPERATION IN THAT INSTITUTION FOR THIRTY YEARS.

By GEORGE W. NORRIS, M.D.,
LATE SURGEON TO THE HOSPITAL.

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In the 22d, 26th, and 28th volumes of the American Journal of the Medical Sciences, I published statistical tables of all of the capital amputations performed at the Pennsylvania Hospital during the twenty years from January, 1830, to January, 1850, with the view of showing the mortality following these operations. I now give a continuation of these statistical tables, carried on for another ten years, viz., to January, 1860, drawn up in a manner similar to those already published, with a summary appended of the thirty years' experience of our Institution in this class of cases.

In the tables, all amputations in which the operation was performed within twenty-four hours after the occurrence of the accident are included under the head of immediate, and the cases treated of this class were generally of the most desperate kind, resulting from railroad accidents, machinery, &c., where the soft parts were as seriously injured as the bones.

## TABLE OF CASES.

| No. | Admission. | Name. | Age. | Disease or Injury. | Part Amputated. | Immediate or otherwise. | Result. | Period of Discharge or Death. |
|---|---|---|---|---|---|---|---|---|
| | 1850. | | | | | | | |
| 1 | January 4th, | Thomas Benckert, . | 8 | Compound and comminuted fract. of leg, | Leg, | Immediate, | Cured, | Feb. 14th, 1850. |
| 2 | Feb. 6th, | William Bull, . . . | 10 | Compound fracture of legs, . . . | Leg, | Immediate, | Cured, | July 11th, 1850. |
| 3 | Feb. 14th, | Hugh Darcy, . . . | 28 | Compound fracture of forearm, . . | Forearm, | — | Cured, | June 5th, 1850. |
| 4 | March 31st, | Joseph Williams, col., | 21 | Gunshot wound of hand, . . . | Forearm, | Immediate, | Cured, | May 16th, 1850. |
| 5 | April 4th, | Robert McManus, . | 14 | Compound fracture of forearm, . . | Forearm, | Immediate, | Cured, | June 6th, 1850. |
| 6 | April 9th, | Samuel Ennis, . . | 15 | Compound fracture of forearm, . . | Arm, | Immediate, | Cured, | June 20th, 1850. |
| 7 | April 25th, | Jacob Fusz, . . . | 27 | Compound fracture of leg, hand, and face, | Leg, | Immediate, | Died, | May 3d, 1850. |
| 8 | April 19th, | Frank Aiken, . . . | 20 | Gunshot wound of knee, . . . | Thigh, | — | Cured, | Aug. 8th, 1850. |
| 9 | April 30th, | James Fleet, . . . | 32 | Compound fracture of arm, . . . | Shoulder-joint, | Immediate, | Cured, | July 27th, 1850. |
| 10 | May 8th, | Edmund B. Lermond, | 42 | Gangrene of leg, . . . . . | Thigh, | — | Died, | May 13th, 1850. |
| 11 | June 10th, | Samuel Budd, . . . | 19 | Compound fracture thigh and fract. leg, | Thigh, | Immediate, | Cured, | Aug. 1st, 1850. |
| 12 | July 9th, | Wm. John Pollock, . | 11 | Compound fracture of leg, . . . | Thigh, | Immediate, | Cured, | Nov. 30th, 1850. |
| 13 | July 12th, | R. J. Hunter, . - . | 36 | Compound and comminuted fract. ankle, | Leg, | Immediate, | Cured, | Aug. 31st, 1850. |
| 14 | August 7th, | George Stockbine, . | 19 | Compound fracture of humerus, . . | Arm, | Immediate, | Cured, | Oct. 18th, 1850. |
| 15 | August 15th, | William Maher, . . | 19 | Compound fracture of forearm, . . | Forearm, | Immediate, | Cured, | Sept. 23d, 1850. |

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|---|---|---|---|---|---|---|---|---|
| 16 | August 16th, | Samuel Johnson, col., | 13 | Compound fracture of forearm and elbow, | Arm, | Immediate, | Cured, | |
| 17 | August 26th, | Joshua Myer, . . . | 23 | Compound fracture of forearm, . . | Forearm, | Immediate, | Cured, | Oct. 7th, 1850. |
| 18 | Sept. 17th, | Hugh Higgins, . . | 28 | Compound fracture of hand, . . . | Forearm, | Immediate, | Cured, | Oct. 23d, 1850. |
| 19 | October 9th, | William Roun, . . | 18 | Compound fracture of leg, . . . | Leg, | Immediate, | Cured, | Nov. 18th, 1850. |
| 20 | October 13th, | Joseph Rambo, . . | 21 | Compound fracture of arm and forearm, | Arm, | Immediate, | Cured, | Jan. 31st, 1851. |
| 21 | Nov. 10th, | Dennis Muldoun, . . | 9 | Compound fracture of foot, . . . | Partial of foot, | — | Cured, | Jan. 1st, 1851. |
| 22 | Nov. 30th, | Matthew McDonough, | 11 | Compound fracture of leg, . . . | Thigh, | Immediate, | Cured, | June 5th, 1851. |
| 23 | Dec. 3d, 1851. | William Mitchell, . | 47 | Compound fracture of leg, . . . | Leg, | Immediate, | Died, | Dec. 21st, 1850. |
| 24 | Jan. 14th, | Charles I. Hare, . . | 24 | Comp'd dislocated elbow and lacer. arm, | Arm, | Immediate, | Cured, | Feb. 25th, 1851. |
| 25 | January 9th, | William Carr, . . . | 13 | Ulcerated and necrosed leg, . . . | Thigh, | — | Cured, | June 23d, 1851. |
| 26 | Jan. 24th, | Henry Perkins, . . | 68 | Comp. fract. and lacerated hand and wrist, | Forearm, | Immediate, | Died, | Jan. 26th, 1851. |
| 27 | Feb. 12th, | William H. Lenoir, . | 8 | Gangrene of foot from laceration, . . | Leg, | — | Cured, | May 12th, 1851. |
| 28 | March 14th, | Edward Duffy, col'd, | 54 | Comminuted fracture of foot, . . | Leg, | Immediate, | Died, | March 21st, 1851. |
| 29 | March 19th, | Thomas Kennedy, . | 17 | Lacerated and fractured hand, . . | Forearm, | Immediate, | Cured, | May 17th, 1851. |
| 30 | April 1st, | Robert J. Christy, . | 10 | Compound fracture of foot and leg, . | Leg, | Immediate, | Cured, | June 23d, 1851. |
| 31 | May 31st, | Joseph Osler, . . . | 34 | Compound fracture of hand and forearm, | Forearm, | Immediate, | Cured, | July 12th, 1851. |
| 32 | July 14th, | John M. Hasser, . . | 11 | Compound and comminuted fract. of leg, | Thigh, | Immediate, | By friends cured af terwards. | July 16th, 1851. |
| 33 | August 4th, | Matthew Shay, . . | 41 | Compound fracture of foot, . . . | Leg, | Immediate, | Cured, | Oct. 10th, 1851. |
| 34 | August 29th, | Patrick McAdam, . | 29 | Compound and comminuted fract. of leg, | Leg, | Immediate, | Cured, | Oct. 20th, 1851. |

TABLE OF CASES—*Continued.*

| No. | Admission. | Name. | Age. | Disease or Injury. | Part Amputated. | Immediate or otherwise. | Result. | Period of Discharge or Death. |
|---|---|---|---|---|---|---|---|---|
| | 1852. | | | | | | | |
| 35 | Jan. 16th, | James Nickson, . . | 21 | Compound and comminuted fract. of foot, | Leg, | Immediate, | Cured, | May 28th, 1852. |
| 36 | Jan. 16th, | James Kidney, . . | 19 | Compound and comminuted fract. of foot, | Leg, | Immediate, | Cured, | May 28th, 1852. |
| 37 | January 1st, | Thomas Cunington, . | 62 | Gangrene of foot (from frost), . . | Leg, | — | Cured, | March 25th, 1852. |
| 38 | January 23d, | John Holland, col'd, | 30 | Gangrene of foot (from frost), . . | Leg, | — | Cured, | Feb. 28th, 1852. |
| 39 | Feb. 4th, | Robert Hood, . . . | 28 | Mortification of foot following burn, . | Leg, | — | Cured, and for misconduct | July 27th, 1852. |
| 40 | Feb. 7th, | Jno. B. Ferguson, col., | 22 | Gangrene of foot (from frost), . . | Leg, | — | Died, | March 4th, 1852. |
| 41 | March 5th, | John Kehoe, . . . | — | Compound and comminuted fract. of leg, | Leg, | Immediate, | Died, | March 5th, 1852. |
| 42 | March 18th, | Charles May, col'd, . | 25 | Compound fracture of hand and wrist, . | Forearm, | Immediate, | Cured, | May 18th, 1852. |
| 43 | March 13th, | Jeremiah Thompson, | 22 | Secondary hemorrhage after gunshot fracture of the hand, | Arm, | — | Died, | March 27th, 1852. |
| 44 | April 9th, | William Gilchrist, . | 26 | Lacerated wound of wrist and hand, . | Forearm, | Immediate, | Cured, | May 10th, 1852. |
| 45 | April 12th, | Washington Hallman, | 22 | Comp. and comm. fract. of feet and ankles, with fract. femur left side, | Legs, | Immediate, | Cured, | June 5th, 1852. |
| 46 | April 12th, | Thomas Brown, . . | 21 | Compound fracture and lacerated leg, . | Leg, | Immediate, | Cured, | August 2d, 1852. |
| 47 | May 15th, | Adam Fopless, . . | 49 | Necrosis of the tibia, . . . | Leg, | — | Died, | May 23d, 1852. |
| 48 | May 16th, | William Ward, . . | 21 | Compound fracture and lacerated leg, . | Thigh, | Immediate, | Died, | May 16th, 1852. |
| 49 | May 18th, | Isaac Dougherty, . | 24 | Compound and comm. fract. of forearm, | Forearm, | Immediate, | Cured, | August 2d, 1852. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 50 | May 25th, | John Tyghe, . . . | 19 | Compound fracture of arm and forearm, | Arm, | Immediate, | Cured, | June 25th, 1852. |
| 51 | June 14th, | William McCann, . | 40 | Compound fracture of humerus, . . | Arm, | Immediate, | Cured, | August 2d, 1852. |
| 52 | June 18th, | John Weldy, . . . | 23 | Compound fracture of leg and os calcis, | Leg, | Immediate, | Cured, | Aug. 30th, 1852. |
| 53 | Jan. 30th, | John Bartleson, . . | 19 | Necrosis of forearm, . . . . | Forearm, | — | Cured, | Aug. 30th, 1852. |
| 54 | July 29th, | John Brown, . . . | 32 | Compound fracture of legs and hand, . | Leg, | Immediate, | Died, | July 29th, 1852. |
| 55 | Sept. 9th, | John Hudson, . . . | 18 | Compound fracture of forearm (gunshot), | Arm, | Immediate, | Cured, | Nov. 1st, 1852. |
| 56 | Sept. 25th, | Henry Adair, . . . | 22 | Compound fracture of forearm, . . | Arm, | Immediate, | Cured, | Dec. 20th, 1852. |
| 57 | October 5th, | Thomas Powers, . . | 41 | Compound fracture of forearm, . . | Forearm, | Immediate, | Cured, | Dec. 6th, 1852. |
| 58 | October 12th, | M. Scott, . . . . | 16 | Shattered hand, . . . . . | Forearm, | Immediate, | Cured, | Nov. 13th, 1852. |
| 59 | Nov. 20th, | Charles Murray, col'd, | 26 | Hand torn off by machinery, . . . | Forearm, | Immediate, | Cured, | Dec. 20th, 1852. |
| 60 | Nov. 22d, | Isaac Jones, . . . | 14 | Compound fractures of arm and forearm, | Arm, | Immediate, | Cured, | Jan. 31st, 1852. |
| 61 | Dec. 25th, 1853. | Stephen Clark, . . | 23 | Gunshot wound of hand, . . . | Forearm, | — | Died, | Jan. 25th, 1853. |
| 62 | April 11th, | Charles Lyntz, . . | 46 | Compound fractures of arm and forearm, | Arm, | Immediate, | Cured, | July 28th, 1853. |
| 63 | May 16th, | John Wooten, Jr., . | 33 | Compound and comm. fracture of forearm, | Arm, | Immediate, | Cured, | July 2d, 1853. |
| 64 | May 16th, | John Kelly, . . . | 36 | Compound fracture of metacarpus, &c., | Wrist-joint, | Immediate, | Cured, | July 11th, 1853. |
| 65 | May 21st, | John Gallagher, . . | 15 | Compound fracture of hand, . . . | Forearm, | Immediate, | Cured, | July 6th, 1853. |
| 66 | June 3d, | Matthew Daily, . . | 53 | Compound fracture of thigh, . . . | Thigh, | Immediate, | Cured, | Oct. 25th, 1853. |
| 67 | June 4th, | William Harrison, . | 23 | Necrosis of the femur, . . . . | Thigh, | — | Cured, | Sept. 8th, 1853. |
| 68 | July 26th, | William Tate, . . . | 58 | Compound and comm. fract. metacarpals, | Forearm, | Immediate, | Cured, | Nov. 24th, 1853. |

TABLE OF CASES—*Continued.*

| No. | Admission. | Name. | Age. | Disease or Injury. | Part Amputated. | Immediate or otherwise. | Result. | Period of Discharge or Death. |
|---|---|---|---|---|---|---|---|---|
| | 1853. | | | | | | | |
| 69 | August 11th, | Robert Warner, . . | 25 | Lacerated wound, . . . . . | Wrist-joint, | Immediate, | Cured, | Sept. 7th, 1853. |
| 70 | August 18th, | John M. Justice, . . | 42 | Gunshot wound of hand, . . . . | Arm, | Immediate, | Cured, | Sept. 22d, 1853. |
| 71 | August 28th, | James Conway, . . | 40 | Compound fract. of humerus and forearm, | Arm, | — | Cured, | Oct. 25th, 1853. |
| 72 | Sept. 5th, | Thomas Kelsh, . . | 30 | Gunshot wound of hand, . . . . | Forearm, | Immediate, | Cured, | Sept. 27th, 1853. |
| 73 | Sept. 11th, | George Rivell, . . | 48 | Gunshot wound of hand, . . . . | Forearm, | Immediate, | Cured, | Oct. 9th, 1853. |
| 74 | Sept. 15th, | Charles Hunter, col'd, | 21 | Compound and comminuted fract. of arm, | Shoulder-joint, | Immediate, | Cured, | Nov. 14th, 1853. |
| 75 | Sept. 1st, | James H. Barry, . . | 51 | Diseased foot, . . . . . | Leg, | — | Cured, | Nov. 8th, 1853. |
| 76 | October 17th, | William Vansciver, . | 24 | Compound fracture of head of humerus and lacerations, | Shoulder-joint, | Immediate, | Died, | Oct. 24th, 1853. |
| 77 | July 26th, | William Tate, . . . | 58 | Caries and ulceration of wrist, . . | Forearm, | — | Cured, | Nov. 24th, 1853. |
| 78 | July 14th, | Hugh Mulholland, . | 27 | Fract. femur and severe lacerated wound, | Thigh, | — | Cured, | Jan. 8th, 1854. |
| 79 | Nov. 3d, | Peter Lavel, . . . | 19 | Caries and ulceration of foot, . . . | Leg, | — | Cured, | Jan. 13th, 1854. |
| 80 | Nov. 18th, | —— White, . . . | 15 | Hand and wrist torn off, . . . . | Forearm, | Immediate, | Cured, | Dec. 22d, 1853. |
| 81 | Nov. 10th, | James Johnson, . . | 14 | Lacerated wounds of axilla and arm, mortification following, | Arm, | — | Cured, | Feb. 16th, 1854. |
| 82 | Nov. 21st, | John McCann, . . . | 29 | Hemorrhage from aneurism, . . . | Thigh, | — | Died, | Dec. 11th, 1853. |
| 83 | Dec. 17th, | Richard Mullon, . . | 24 | Compound and comminuted fract. of thigh, | Thigh, | Immediate, | Cured, | April 1st, 1854. |

| | 1854. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 84 | February 1st, | Joseph Barclay, . . | 48 | Compound and comminuted fract. of arm, | Arm, | Immediate, | Cured, | June 12th, 1854. |
| 85 | Feb. 11th, | Charles E. Proctor, . | 20 | Comp. and comminuted fracture of hand, | Forearm, | — | Cured, | May 29th, 1854. |
| 86 | March 17th, | Benjamin Davis, . . | 31 | Lacerated wound and fractured hand, . | Forearm, | Immediate, | Cured, | April 26th, 1854. |
| 87 | March 23d, | Patrick Dougherty, . | 39 | Compound fracture of left arm, and comminuted fracture of left hand, | Forearm, | Immediate, | Cured, | May 18th, 1854. |
| 88 | March 23d, | John Weeks, . . . | 48 | Compound and comminuted fract. of thigh, | Thigh, | — | Died, | March 27th, 1854. |
| 89 | March 24th, | Andrew Newton, . . | 29 | Arm torn off, . . . . . | Arm, | Immediate, | Cured, | May 31st, 1854. |
| 90 | April 6th, | Edward Green, . . | 20 | Compound and comminuted fracture of hand and laceration, | Forearm, | Immediate, | Died, | April 9th, 1854. |
| 91 | April 7th, | Henry Carlin, . . . | 39 | Compound fracture of elbow, forearm, and wrist, | Arm, | Immediate, | Cured, | May 18th, 1854. |
| 92 | April 18th, | Hiram Massey, . . | 33 | Lacerated and fractured forearm, . . | Forearm, | Immediate, | Cured, | May 22d, 1854. |
| 93 | May 1 (1853), | William Fodell, . . | 21 | Diseased knee-joint, . . . . | Thigh, | — | Cured, | Aug. 19th, 1854. |
| 94 | May 3d, | Frederick Elenz, . . | 31 | Compound fracture of ankle-joint, . . | Leg, | — | Cured, | Aug. 24th, 1854. |
| 95 | May 19th, | Barney O'Neil, . . | 24 | Caries of knee-joint, . . . . | Thigh, | — | Cured, | Oct. 23d, 1854. |
| 96 | June 24th, | John Luick, . . . | 27 | Compound and comminuted fract. of arm, | Shoulder-joint, | Immediate, | Died, | June 25th, 1854. |
| 97 | June 24th, | G. Washington Myers, | 17 | Caries, . . . . . | Leg, | — | Cured, | Sept. 26th, 1854. |
| 98 | June 29th, | Harriet Valentine, c., | 19 | Diseased knee, . . . . . | Thigh, | — | Died, | Aug. 8th, 1854. |
| 99 | July 22d, | Owen McIlwee, . . | 27 | Comp. and comm. fracture of leg and foot, | Leg, | — | Died, | July 25th, 1854. |
| 100 | July 25th, | Patrick Hurley, . . | 18 | Compound fracture of leg and laceration, | Thigh, | — | Cured, | Dec. 7th, 1854. |
| 101 | August 1st, | Thomas Keefe, . . | 19 | Incised wound of ankle-joint, . . . | Leg, | Immediate, | Cured, | Nov. 13th, 1854. |

TABLE OF CASES—*Continued.*

| No. | Admission. | Name. | Age. | Disease or Injury. | Part Amputated. | Immediate or otherwise. | Result. | Period of Discharge or Death. |
|---|---|---|---|---|---|---|---|---|
| | 1854. | | | | | | | |
| 102 | August 22d, | John Watmough, . | 19 | Burn of hand; mortification after, . . | Partial of hand, | — | Cured, | Oct. 19th, 1854. |
| 103 | August 24th, | James McPeak, . . | 23 | Secondary hemorrhage after wound of forearm, | Arm, | — | Cured, | Sept. 16th, 1854. |
| 104 | August 26th, | William Curry, . . | 8 | Laceration and fractured foot, . . | Partial of foot, | Immediate, | Cured, | Feb. 26th, 1855. |
| 105 | August 28th, | Charles Schaeffer, . | 8 | Compound and comminuted fract. leg, . | Leg, | Immediate, | Cured, | April 4th, 1855. |
| 106 | Sept. 17th, | William C. Griffin, . | 20 | Gunshot wound of hand, . . . | Forearm, | Immediate, | Cured, | Sept. 8th, 1854. |
| 107 | Sept. 27th, | Lewis Churchill, . . | 21 | Compound fracture of hand, . . . | Wrist-joint, | Immediate, | Cured, | Nov. 10th, 1854. |
| 108 | October 3d, | David Henry, . . . | 32 | Amputated foot, . . . . | Partial of foot (Chopart's), | Immediate, | Cured, | Nov. 6th, 1854. |
| 109 | Sept. 20th, | Levi W. Brown, . . | 24 | Compound fracture of forearm, . . | Arm, | — | Cured, | Nov. 11th, 1854. |
| 110 | Nov. 11th, | William Bogan, . . | 6 | Compound and comminuted fract. leg, . | Leg, | Immediate, | Cured, | Dec. 29th, 1854. |
| 111 | Nov. 9th, | John Anderson, . . | 28 | Compound and comminuted fract. leg, . | Leg, | — | Cured, | Dec. 21st, 1854. |
| 112 | Nov. 11th, | Robert Wilson, . . | 18 | Fracture of knee-joint, . . . . | Thigh, | — | Cured, | Feb. 15th, 1855. |
| | 1855. | | | | | | | |
| 113 | Jan. 10th, | Lambert Hard, . . | 8 | Lacerated wound of hand, . . . | Wrist-joint, | Immediate, | Cured, | Feb. 23d, 1855. |
| 114 | Feb. 2d, | John Hannigan, . . | 23 | Compound and comminuted fract. hand, | Forearm, | Immediate, | Cured, | April 13th, 1855. |
| 115 | Feb. 23d, | Henry McCoy, . . | 19 | Compound and comminuted fract. leg, . | Thigh, | — | Died, | March 5th, 1855. |

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|---|---|---|---|---|---|---|---|---|
| 116 | March 19th, | John McNeal, . . | 17 | Compound and comminuted fract. foot, | Leg, | Immediate, | Died, | April 18th, 1855. |
| 117 | May 19th, | Ezekiel V. Carson, . | 38 | Compound fracture of both legs, . . | Leg, | Immediate, | Died, | May 31st, 1855. |
| 118 | May 19th, | Patrick Lynch, . . | 23 | Compound fracture of leg, . . . | Thigh, | — | Died, | June 2d, 1855. |
| 119 | June 1st, | Jacob P. Fetterly, . | 23 | Compound fract. of hand and laceration, | Partial of hand, | Immediate, | Cured, | July 19th, 1855. |
| 120 | July 5th, | James Doyle, . . . | 35 | Compound fracture of leg and foot, . | Thigh, | Immediate, | Died, | July 27th, 1855. |
| 121 | August 7th, | Thomas Wright, . . | 19 | Compound fracture of forearm, . . | Forearm, | Immediate, | Cured, | Oct. 11th, 1855. |
| 122 | August 10th, | Thomas Holdam, . . | 51 | Compound and comminuted fract. of foot, | Leg, | — | Died, | Aug. 13th, 1855. |
| 123 | August 14th, | David Clewes, . . . | 32 | Gunshot wound of forearm, . . . | Forearm, | Immediate, | Cured, | October 4th, 1855. |
| 124 | July 25th, | George Stouffer, . . | 25 | Diseased knee, . . . . . | Thigh, | — | Died, | Sept. 16th, 1855. |
| 125 | October 11th, | Henry Roth, . . . | 15 | Arm torn off and lacerations, . . | Shoulder-joint, | Immediate, | Cured, | Dec. 11th, 1855. |
| 126 | October 14th, | James Taggart, . . | 24 | Compound and comminuted fract. leg, . | Leg, | Immediate, | Cured, | Jan. 17th, 1856. |
| 127 | Nov. 17th, | Isaac Mullen, . . . | 29 | Caries of bones of foot, . . . . | Leg, | — | Cured, | Jan. 8th, 1856. |
| 128 | Nov. 30th, 1856. | Charles H. McMullen, | 11 | { Comm. fract. and laceration of foot and leg, and lacer. of opposite foot, } | Leg, | Immediate, | Died, | Dec. 14th, 1856. |
| 129 | January 7th, | Sarah Busch, . . . | 45 | Compound and comminuted fract. ankle, | Leg, | Immediate, | Died, | Jan. 17th, 1856. |
| 130 | Jan. 15th, | Samuel Stackpole, . | 23 | Compound and comminuted fract. arm, | Arm, | Immediate, | Cured, | March 8th, 1856. |
| 131 | Nov. 6 (1855) | James King, . . . | 35 | Osteo-sarcoma of thigh, . . . . | Thigh, | — | Died, | June 3d, 1856. |
| 132 | March 20th, | Charles Y. Preston, . | 22 | Compound and comm. fract. of forearm, | Forearm, | Immediate, | Cured, | June 5th, 1856. |
| 133 | April 11th, | Thomas Kett, . . . | 15 | Lacerated hand, . . . . . | Wrist-joint, | Immediate, | Cured, | June 4th, 1856. |

TABLE OF CASES—*Continued.*

| No. | Admission. | Name. | Age. | Disease or Injury. | Part Amputated. | Immediate or otherwise. | Result. | Period of Discharge or Death. |
|---|---|---|---|---|---|---|---|---|
| | 1856. | | | | | | | |
| 134 | June 9th, | Patrick O'Neall, . . | 39 | Compound fracture of foot—crushed, . | Leg, | Immediate, | Died, | June 22d, 1856. |
| 135 | April 29th, | Alexander Laidlaw, . | 22 | Comminuted fracture of arm, . . . . | Arm, | — | Cured, | Aug. 7th, 1856. |
| 136 | May 17th, | William Chapman, . | 40 | Caries of knee-joint, . . . . | Thigh, | — | Cured, | Sept. 1st, 1856. |
| 137 | July 4th, | Charles De Boos, . . | 15 | Shattered hand, . . . . . | Wrist-joint, | Immediate, | Cured, | Aug. 11th, 1856. |
| 138 | Dec. 12 (1855) | Samuel Kempner, . | 22 | Gunshot wound of thigh; gangrene following lig. of popliteal for hemorr., | Leg, | — | Cured, | Aug. 21st, 1856. |
| 139 | July 17th, | James Mahoney, . . | 15 | Compound and comm. fract. leg, . . . | Leg, | Immediate, | Cured, | Nov. 13th, 1856. |
| 140 | June 24th, | James Mars, . . . | 35 | Caries of foot and ankle, . . . | Leg, | — | Cured, | Oct. 20th, 1856. |
| 141 | August 3d, | James McGarry, . . | 21 | Crushed hand and wrist, . . . | Forearm, | Immediate, | Died, | Aug. 24th, 1856. |
| 142 | July 17th, | Thomas Rose, . . . | 22 | Fract. thigh and comp. fract. both legs, | Thigh, | — | Died, | August —, 1856. |
| 143 | Jan. 28th, | James Milligan, . . | 16 | Lacerated hand and forearm, . . | Forearm, | — | Cured, | October 9th, 1856. |
| 144 | July 28th, | David McLaughlin, . | 25 | Compound and comm. fracture forearm, | Forearm, | Immediate, | Cured, | Sept. 17th, 1856. |
| 145 | August 5th, | James McDonald, . | 38 | Compound and comm. fracture of leg, . | Leg, | Immediate, | Died, | Aug. 12th, 1856. |
| 146 | August 24th, | Alexander McAllister, | 17 | Shattered hand, . . . . . | Wrist-joint, | Immediate, | Cured, | Oct. 6th, 1856. |
| 147 | August 30th, | John Graham, . . | 33 | Amputated forearm, . . . . | Forearm, | Immediate, | Cured, | Oct. 9th, 1856. |
| 148 | Sept. 7th, | Hugh Gormley, . . | 36 | Popliteal aneurism and gang. sac, . . | Thigh, | — | Died, | Oct. 25th, 1856. |

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|---|---|---|---|---|---|---|---|---|
| 149 | Sept. 7th, | Peter Rementer, . . | 21 | Gunshot wound of knee-joint, . . | Thigh, | Immediate, | Died, | Oct. 29th, 1856. |
| 150 | Sept. 23d, | Miles Ward, . . . | 28 | Comminuted and compound fract. foot, | Leg, | Immediate, | Cured, | Nov. 10th, 1856. |
| 151 | Sept. 26th, | Michael Hanhoff, . | 22 | Gunshot wound of arm, . . . | Arm, | Immediate, | Died, | Oct. 30th, 1856. |
| 152 | Sept. 27th, | Edward McGraw, . | 14 | Comp. and comm. fract. forearm and arm, | Arm, | Immediate, | Cured, | Nov. 20th, 1856. |
| 153 | August 21st, | Eliza Clark, . . . | 23 | Osteoid tumor of leg, . . . . | Leg, | — | Died, | Oct. 31st, 1856. |
| 154 | October 20th, | Robert Thornton, . | 43 | Shattered hand and forearm, . . . | Forearm, | Immediate, | Cured, | Dec. 18th, 1856. |
| 155 | October 20th, | John Joyce, . . . | 39 | Leg cut off by railroad, . . . . | Thigh, | — | Cured, | Dec. 20th, 1856. |
| 156 | Nov. 1st, | James Barry, . . . | 31 | Conical and ulcerated stump, . . | Thigh, | — | Cured, | Feb. 11th, 1857. |
| 157 | Dec. 3d, | John Hawthorn, . . | 23 | Crushed foot, . . . . . | Leg, | Immediate, | Cured, | April 4th, 1857. |
| 158 | Dec. 23d, | Geo. Nickerson, col'd, | 33 | Gunshot fracture of femur, . . . | Thigh, | — | Died, | Jan. 17th, 1857. |
| 159 | Dec. 24th, 1857. | Thomas Ely, col'd, . | 68 | Crushed foot, . . . . . | Leg, | Immediate, | Died, | Dec. 26th, 1856. |
| 160 | Jan. 6th, | Chas. Supphay, col'd, | 49 | Frozen feet, . . . . . | Leg, | — | Died, | Feb. 16th, 1857. |
| 161 | Jan. 14th, | William Wark, . . | 40 | Gunshot wound of forearm, . . . | Forearm, | Immediate, | Cured, | Feb. 27th, 1857. |
| 162 | Nov.17(1856) | Susan Lundy, . . . | 51 | Diseased knee, . . . . . | Thigh, | — | Cured, | July 27th, 1857. |
| 163 | February 3d, | Daniel Rogers, . . | 35 | Compound and comminuted fract. leg, . | Thigh, | — | Cured, | July 9th, 1857. |
| 164 | March 17th, | John Carey, . . . | 30 | Frosted feet, . . . . . | Partial of foot, | — | Cured, | May 14th, 1857. |
| 165 | March 10th, | Joseph Buiorton, . | 38 | Frosted feet, . . . . . | Partial of foot, | — | Cured, | Oct. 15th, 1857. |
| 166 | April 22d, | James Stackhouse, . | 21 | Compound and comminuted fract. foot, | Leg, | Immediate, | Cured, | July 11th, 1857. |

TABLE OF CASES—*Continued.*

| No. | Admission. | Name. | Age. | Disease or Injury. | Part Amputated. | Immediate or otherwise. | Result. | Period of Discharge or Death. |
|---|---|---|---|---|---|---|---|---|
| | 1857. | | | | | | | |
| 167 | April 23d, | George W. Maurice, | 28 | Crushed hand and forearm, . . . | Arm, | Immediate, | Cured, | June 6th, 1857. |
| 168 | April 24th, | Charles Wilson, . . | 16 | Caries of knee and deformed limb, . | Thigh, | — | Cured, | July 30th, 1857. |
| 169 | June 1st, | William Thomas, . . | 39 | Compound fracture of thigh, . . . | Thigh, | Immediate, | Cured, | July 20th, 1857. |
| 170 | June 8th, | William H. Moore, . | 28 | Compound dislocation and fract. ankle, | Leg, | Immediate, | Cured, | July 16th, 1857. |
| 171 | May 30th, | John Hutchinson, . | 48 | Compound and comm. fracture forearm, | Forearm, | — | Died, | June 18th, 1857. |
| 172 | June 29th, | Andrew Brinckley, c., | 40 | Caries of bones of leg, . . . . | Thigh, | — | Cured, | Sept. 2d, 1857. |
| 173 | June 17th, | Robert Cliff, . . . | 26 | Crushed foot, . . . . . | Leg, | — | Cured, | Nov. 5th, 1857. |
| 174 | June 26th, | Andrew Johnston, . | 30 | Caries of knee, . . . . . | Thigh, | — | Died, | August 7th, 1857. |
| 175 | July 24th, | Patrick O'Brien, . . | 18 | Compound fracture of foot, . . . | Leg, | — | Cured, | Sept. 3d, 1857. |
| 176 | April 6th, | George Bayley, . . | 56 | Ulcer of leg and foot, . . . . | Leg, | — | Cured, | Jan. 2d, 1858. |
| 177 | August 2d, | Manuel Braceland, . | 35 | Compound fracture of elbow, . . | Arm, | — | Died, | Sept. 1st, 1857. |
| 178 | August 20th, | John Wilson, . . . | 18 | Compound and comm. fracture forearm, | Elbow-joint, | Immediate, | Cured, | Oct. 14th, 1857. |
| 179 | August 20th, | Patrick McDonough, | 26 | Crushed foot, . . . . . | Leg, | Immediate, | Cured, | Oct. 3d, 1857. |
| 180 | August 13th, | John McGinley, . . | 21 | Compound fracture of metatarsus, . | Leg, | — | Died, | Sept. 3d, 1857. |
| 181 | October 13th, | Lewis Bernstein, . . | 13 | Lacerated wounds of forearm and arm, . | Arm, | Immediate, | Cured, | Jan. 25th, 1858. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 182 | October 19th, | George Wagner, . . | 13 | Compound fracture and lacerated arm, . | Arm, | Immediate, | Cured, | Dec. 7th, 1857. |
| 183 | Nov. 19th, | Thomas Sharp, . . | 11 | Compound and comm. fracture of arm, . | Arm, | Immediate, | Cured, | Dec. 24th, 1857. |
| 184 | Nov. 24th, | Joseph Caffrey, . . | 19 | Compound fracture of foot, . . | Partial of foot (Hey's), | Immediate, | Cured, | Jan. 15th, 1858. |
| 185 | Nov. 27th, | David Llewellyn, . . | 22 | Compound fracture of leg and laceration, | Leg, | — | Cured, | March 29th, 1858. |
| 186 | Dec. 11th, 1858. | John Train, . . . | 60 | Cancer of arm and forearm, . . . | Arm, | — | Cured, | April 27th, 1858. |
| 187 | January 1st, | Michael Deal, . . . | 26 | Hand blown off and lacerated forearm, . | Forearm, | Immediate, | Cured, | Feb. 12th, 1858. |
| 188 | Jan. 15th, | Margaret Glenn, . . | 58 | Caries of the leg, . . . . . | Leg, | — | Died, | Feb. 1st, 1858. |
| 189 | March 21st, | Alfred Redman, . . | 25 | Compound and comm. fracture of leg, . | Leg, | — | Died, | March 27th, 1858. |
| 190 | March 11th, | Thomas McIntire, . | 14 | Inflamed leg and ankle, . . . | Thigh, | — | Cured, | June 28th, 1858. |
| 191 | May 4th, | James McGonegal, . | 48 | Amputated leg, . . . . | Leg, | Immediate, | Died, | May 13th, 1858. |
| 192 | May ——, | Adam Bauer, . . . | 18 | Gunshot wound of hand, . . . | Forearm, | Immediate, | Cured, | June 22d, 1858. |
| 193 | May 13th, | Thomas Hodson, . . | 56 | Lacerated hand, . . . . . | Wrist-joint, | Immediate, | Cured, | July 8th, 1858. |
| 194 | May 18th, | Charles Hughes, . . | 12 | Lacerated wrist-joint and forearm, . | Forearm, | Immediate, | Cured, | June 16th, 1858. |
| 195 | May 31st, | John Walls, . . . | 14 | Forearm torn off, . . . . . | Arm, | — | Died, | June 11th, 1858. |
| 196 | June 3d, | Henry Westmond, . | 24 | Crushed foot, . . . . . | Leg, | Immediate, | Died, | July 9th, 1858. |
| 197 | June 10th, | Richard Williams, . | 38 | Comp. fracture of forearm and wrist, and lacerated do., | Forearm, | Immediate, | Cured, | Aug. 19th, 1858. |
| 198 | June 11th, | Edward McDonald, . | 12 | Foot torn off, . . . . . | Leg, | Immediate, | Cured, | July 26th, 1858. |
| 199 | July 2d, | Terence Farley, . . | 10 | Compound fracture of metatarsus, | Partial of foot (Pirogoff), | Immediate, | Cured, | Dec. 16th, 1858. |
| 200 | July 2d, | Nicholas Snyder, . . | 5 | Compound and comm. fract. tarsus, | Partial of foot (Pirogoff), | Immediate, | Cured, | Sept. 16th, 1858. |

TABLE OF CASES—*Continued.*

| No. | Admission. | Name. | Age. | Disease or Injury | Part Amputated. | Immediate or otherwise. | Result. | Period of Discharge or Death. |
|---|---|---|---|---|---|---|---|---|
| | 1858. | | | | | | | |
| 201 | August 17th, | George Lowber, . . | 40 | Lacerated forearm, . . . . | Forearm, | Immediate, | Cured, | Sept. 17th, 1858. |
| 202 | August 17th, | Thomas H. Snyder, . | 40 | Gunshot wound of forearm, . . . | Forearm, | Immediate, | Died, | Sept. 8th, 1858. |
| 203 | Sept. 1st, | Fritz Maillardet, . . | 5 | Fractured thighs, . . . . . | Thigh, | Immediate, | Died, | Sept. 2d, 1858. |
| 204 | October 9th, | William Myers, . . | 28 | Crushed foot, . . . . . | Leg, | Immediate, | Cured, | Dec. 14th, 1858. |
| 205 | October 14th, | George Grant, . . . | 24 | Compound and comminuted fract. leg, . | Leg, | Immediate, | Cured, | Dec. 6th, 1858. |
| 206 | October 26th, | Frederick Trump, . | 15 | Arm torn off, . . . . . | Shoulder-joint, | Immediate, | Cured, | Jan. 27th, 1859. |
| 207 | October 27th, | John Walter, . . . | 33 | Compound fracture humerus (condyles), | Arm, | — | Cured, | Jan. 8th, 1859. |
| 208 | Nov. 13th, | Hugh Sinamon, . . | 31 | Comminuted and compound fract. ankle, | Leg, | Immediate, | Died, | Nov. 19th, 1858. |
| 209 | Nov. 18th, 1859. | Thomas Rossiter, . . | 7 | { Compound and comminuted fracture of thigh and lacerations, } | Thigh, | Immediate, | Cured, | Feb. 14th, 1859. |
| 210 | Feb. 5th, | George Watson, . . | 21 | Compound fracture of elbow-joint, . | Arm, | Immediate, | Cured, | March 10th, 1859. |
| 211 | Feb. 2d, | James Berry, . . . | 55 | Cancer of the hand, . . . . | Forearm, | — | Cured, | March 28th, 1859. |
| 212 | Feb. 11th, | Sarah B. Noble, . . | 15 | Lacerated arm, with division of brachial, | Arm, | Immediate, | Cured, | April 18th, 1859. |
| 213 | Feb. 22d, | Edward McCann, . | 28 | Comp. fracture of elbow and laceration, | Arm, | Immediate, | Cured, | June 13th, 1859. |
| 214 | Feb. 25th, | Michael Boyle, . . | 33 | Compound and comm. fracture of foot, . | Thigh, | — | Cured, | July 23d, 1859. |

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|---|---|---|---|---|---|---|---|---|
| 215 | May 3d, | Charlotte Dean, . . | 64 | Necrosis of tibia and diseased knee, . . | Thigh, | — | Died, | May 12th, 1859. |
| 216 | May 11th, | G. W. Dutton, . . | 34 | Compound dislocation of metacarpus, . | Forearm, | — | Died, | May 23d, 1859. |
| 217 | July 5th, | Andrew J. Evanson, | 40 | Compound fracture of elbow-joint, and ruptured brachial, | Arm, | Immediate, | Cured, | Oct. 3d, 1859. |
| 218 | June 20th, | James Thornton, . . | 40 | Laceration and burned hand, . . | Forearm, | — | Cured, | Aug. 6th, 1859. |
| 219 | July 15th, | Josiah Chapman, . . | 21 | Compound and comm. fracture of foot, . | Leg, | Immediate, | Died, | July 25th, 1859. |
| 220 | August 10th, | Joseph Adams, . . | 16 | Comminuted fracture of metacarpus, . | Forearm, | Immediate, | Cured, | Sept. 26th, 1859. |
| 221 | Sept. 22d, | Patrick McCabe, . . | 31 | Compound and comm. fracture of leg, . | Leg, | — | Cured, | Nov. 17th, 1859. |
| 222 | October 3d, | Joseph Tudor, . . | 27 | Crushed hand and wrist, . . . | Forearm, | Immediate, | Cured, | Nov. 7th, 1859. |
| 223 | October 4th, | John Fow, . . . . | 46 | Deformed and ulcerated leg, . . . | Leg, | — | Cured, | Feb. 20th, 1860. |
| 224 | October 25th, | John Kane, . . . | 24 | Crushed foot, . . . . . | Leg, | Immediate, | Cured, | April 11th, 1860. |
| 225 | October 24th, | John McMullin, . . | 18 | Crushed foot, . . . . . | Leg, | Immediate, | Cured, | Dec. 8th, 1859. |
| 226 | Nov. 7th, | William Quigg, . . | 9 | Lacerated wound of elbow, arm, and forearm, | Arm, | Immediate, | Cured, | Jan. 5th, 1860. |
| 227 | Nov. 16th, | Jeremiah Buchanan, | 39 | Gunshot wound of forearm, . . . | Forearm, | Immediate, | Cured, | Dec. 11th, 1860. |
| 228 | Nov. 19th, | —— Duncan, . . | 33 | Caries of knee-joint, . . . . | Thigh, | — | Cured, | Jan. 16th, 1860. |

From the above table it will be seen that from January, 1850, to January, 1860, there were 228 capital amputations performed. Of these, 173 were cured and 55 died.

Forty-three were of the thigh, seventy of the leg, eight of the feet, six at the shoulder-joint, thirty-eight of the arm, fifty-two of the forearm, eight at the wrist-joint, two of the hand, and one at the elbow-joint.

One hundred and forty-six of the 228 operations were primary, being done for recent injuries within twenty-four hours after the occurrence of the accident, and of these 119 were cured, and 27 died; 42 were secondary, of which 27 were cured and 15 died; 40 were for the cure of chronic affections, of which 27 were cured and 13 died.

Twenty-five of the whole number in the table were done at the joints, of which 23 were cured and 2 died.

One hundred and seven of the amputations were of the upper extremity, of which 94 were cured and 13 died.

One hundred and twenty-one were of the lower extremity, of which 85 were cured and 36 died.

In adding the results furnished in the above ten years to those given in the volumes of the American Journal already referred to, for the twenty years previously, we arrive at the following results:

Of 428 amputations upon 424 patients, performed during the thirty years from 1830 to 1860, 321 were cured and 103 died. Of these, 261 were primary, of which 54 died; 83 were secondary, of which 31 died; 84 were for the cure of chronic diseases, of which 18 died.

One hundred and ninety-four of the amputations were of the upper extremity, of which 21 died; 234 were of the lower extremity, of which 74 died; 46 were amputations at the joints, of which 6 died.

One hundred and eighteen of the patients operated on were under 20 years of age, of whom 108 were cured and 10 died; 133 were between 20 and 30, of whom 101 were cured and 32 died; 87 were between 30 and 40, of whom 60 were cured and 27 died; 62 were between 40 and 50, of whom 40 were cured and 22 died; 21 were upwards of 50, of whom 16 were cured and 5 died.

PHYSIOLOGICAL OBSERVATIONS AND EXPERIMENTS

# ON A CASE OF LARGE ARTIFICIAL ANUS,

WITH

AN ACCOUNT OF THE SURGICAL AND MECHANICAL EFFORTS TO CURE.

By WILLIAM HUNT, M.D.,

ONE OF THE SURGEONS TO THE PENNSYLVANIA HOSPITAL.

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On the 23d of October, 1865, a young man placed himself under my care, for treatment for a very large artificial anus, opening through the abdominal wall, in the right iliac region.

He had been a soldier in the Confederate service during the recent war, and was wounded on the 25th of February, 1864, in one of the various actions that took place in Northern Georgia. A ball entered the abdominal wall near the umbilicus, and, passing transversely, emerged a short distance from the anterior superior spinous process of the right side. At first there was no positive evidence of the intestinal canal being implicated; and instead of being kept quiet, as a precautionary measure, the patient was unfortunately purged a short time after being wounded. He was taken to Atlanta, where he arrived on the evening of the 26th. An abscess formed, which was followed by a comparatively small fecal fistula, and from that time to this the opening may be said never to have ceased to discharge fæces.

The treatment, after getting to Atlanta, consisted of water-dressings to the part and the internal administration of opiates. About the 1st of June, 1864, a leaden plate was placed over the opening. Soon after this an abscess formed, which was lanced, and gave exit to fecal discharge.

In January, 1865, an attempt was made (I believe by Dr. Eve) to close the fistula, by laying open the wound in the course of the ball and bringing the edges together. The parts held for about thirty-six hours, when gas and fæces began to discharge, and the attempt was unsuccessful.

In October the patient came to Philadelphia. When I saw him lying in bed there was an enormous artificial anus in the right iliac region, one inch within the anterior superior spinous process, and measuring $2\frac{1}{2}$ inches in its transverse and 2 inches in its longitudinal diameter.

When the parts were cleansed from the accumulated fæces of the night, an appearance was presented that reminded me very forcibly of the celebrated Alexis St. Martin, whom I have seen. In fact, the conditions were precisely similar to his as to the way in which they were produced; the parts involved being different. The anterior walls of the abdomen at the parts indicated had sloughed away, together with a corresponding portion of the front wall of the cœcum and ascending colon.

The edges of these parts had agglutinated, thus protecting the peritoneal cavity, and exposing an open cup of intestine, the posterior wall of which presented its mucous surface, and could be prolapsed through the opening. Above and below the finger could be passed into the canal. From the varying positions that the intestines are well known to assume in the abdominal cavity, some doubt might be entertained as to the portion involved here, but the region points to the cœcum, while the fecal contents, the uniform direction of the peristaltis, and the appearance of the mucous surfaces, left no doubt as to a portion of the colon being implicated. To make this more certain, Professor Joseph Leidy kindly examined the parts with a powerful lens after they were carefully cleansed. He could detect no villi, and

was satisfied that the cœcum and colon were the parts exposed. While the ileo-cœcal valve could not be seen, a constricted portion, corresponding to its position, could easily be felt, and a large catheter, which would traverse upwards, to an unlimited extent, was arrested after passing two or three inches in the opposite direction.

The patient was very desirous of having a surgical operation performed for his relief from a truly deplorable condition. Although the prospect of success was not very encouraging, it was determined, after consultation with Prof. J. Pancoast and Dr. D. H. Agnew, to resort to some form of plastic operation, in order, if possible, to close the opening. Pending the consideration of this operation, and during the progress of recovery from it, certain

PHYSIOLOGICAL OBSERVATIONS AND EXPERIMENTS

were made, which we think are worthy of record here, before describing the operation and its results. These were not as full as they might have been, owing to the fact that the patient, from long suffering, was irritable and more or less annoyed by them. Neither would he permit, nor did we feel justified in urging him, to let us administer extra substances by the mouth, in order to observe their effects on the canal and their time of passage.

*Appearance.*—After washing off the fæces, the mucous surface, when the bowels were inactive, was of a pale pink color. When the stomach was filled with food the posterior wall protruded like a hernia and became redder, but as the fecal contents and debris of the food appeared at the opening it gradually receded; and when these contents, together with the gases, had passed, the parts become quite flaccid and the cup-like appearance was resumed. The time required for these changes varied with the kinds of food. If liquid, they were very rapid; warm coffee would appear, and was readily detected, in from one to three minutes.

*Quantity and Form of Fecal Discharge.*—The amount was at least from 5 to 8 ounces daily, and certainly equalled that discharged by the rectum, in a normal condition. Food of a

laxative property, would sometimes produce diarrhœa. The form of the fæces was mostly that of a soft mass, but sometimes there would be lumps of well-formed matter. An important point is here settled as to the function of the colon. It must be but a sacciform receptacle for the excrement, and possesses little or no secretive power of its own. In support of this also, the patient would have a discharge from the rectum, at *intervals of three or four months.* The accumulation in it, consisting of what little passed the fistula, and its own epithelial detritus must have been very slow and insufficient to excite the expulsive organs to action more frequently. The colon would seem, however, to have an influence over the shaping of the fecal masses.

*Color and Odor.*—As to these two points there were no differences to note from normal fecal discharges by the rectum. They differed according to the food and state of health of the patient, precisely as in other persons. As the opening was at the beginning of the colon, the passive character of that viscus is still further proved by this observation.

*Secretion from Intestinal Surface and its Chemical Reactions.*—Shortly after the surface was wiped clean and dry, it was moistened by a colorless, limpid fluid, exuding from all parts in small quantity. It was never noticed to be abundant enough to collect in drops or to flow. It was *always alkaline.* Observations were taken on this point at all times, morning, noon, and night, and before and after meals, but invariably with the same result. Sometimes there would appear to be a distinct acid or sour odor, emanating from the part, but the test proved the secretion to be alkaline, even under these circumstances.

*Sensibility.*—I think it may be said that the intestinal surface is destitute of common sensibility, when in a normal condition. We tested this repeatedly. The patient would close his eyes, and he could not tell whether anything was touching the surface, nor could he give any idea as to the consistency of the article used. As we approached the border where mucous membrane and skin were continuous,

there was no difficulty in his detecting the presence of foreign articles.

*Peristaltic Movement.*—Immediately at the opening, this could be observed as a sort of protruding and vermicular movement of the posterior wall, but above, where the calibre was perfect, the action was very powerful. The finger would be grasped firmly, and articles would be drawn *up* the ascending colon with a great degree of force. It was necessary for them to be completely surrounded by the intestine to experience this effect, and hence the large amount of material that passed out where the anterior wall was deficient. The direction of this action also, confirms the position of the fistula, as nothing was grasped or drawn in the opposite course.

*Digestive and Absorbent Powers of the Cœcum.*—A few positive experiments demonstrated, that the parts exposed were totally deficient in these properties. The constant alkalinity of the secretion would lead the physiologist to infer this, but our observations thoroughly confirmed it. No effects were produced by medicinal agents, as laudanum, or morphia, applied to the part, nor by anything placed on as a dressing. In this respect there is a great difference from the rectal mucous membrane. As to the digestive powers, for which some claim has been made, they were absolutely nothing. Pieces of tender meat, as venison, beef, and mutton, were tied to strings and passed into the cœcum, when its surface was clean. They were allowed to remain during periods of from five to twelve hours, and when withdrawn, were whitened and softened, as by ordinary maceration, and consequently were increased instead of diminished in weight. No portion was lost or dissolved away, as in the well-known manner incident to experimental gastric and upper intestinal digestions.

*Summary.*—From these observations it would seem proved, that, in man at least, the cœcum and large intestines are passive receptacles of the useless and excrementitious results of the digestive processes. If any of the lower animals have a cœcum capable of digesting food, the analogue of it in

man, as has been suggested, is probably the appendix vermiformis.

### The Surgical Measures

that were resorted to for the relief of our patient were undertaken after various consultations and a great deal of misgiving as to ultimate success. He told us himself that the great thing we would have to contend with was the pressure of the pent-up gases, if the wound was closed by any ordinary method, and that we must therefore try something different from incisions that would bring the edges together anywhere over the opening. There was no prospect of success by a sliding or edge-paring operation. It was therefore determined to take a large flap from the abdomen and to turn it over the cavity with its *cutaneous surface downwards.*

The recognized analogy between skin and mucous membrane justified this procedure, but not knowing from experience how the retroverted or inner surface of the integument would bear exposure or cicatrize, and, being unwilling to trust it, it was thought best to cut another flap from the lateral, femoral, and gluteal regions, and by rotating this to lay it, skin surface outwards, upon the other, in the hope that the two raw surfaces would unite, and thus form a thick anterior and strong, but pliant wall, to the cavity. A gutter or cleft was to be made along the lower border of the opening to which the flaps were to be firmly stitched.

On the 12th of November, 1865, the patient was thoroughly etherized. Prof. J. Pancoast and Dr. D. H. Agnew were present as consulting surgeons. I was also kindly assisted by Drs. T. G. Morton, W. Pancoast, W. Pepper, and T. H. Andrews. A large, thick, semicircular flap, with its base left untouched, was dissected from the abdomen immediately above the opening. The two extremities of the crescentic incision were brought to within a quarter of an inch of the border of the cavity, and the flap was freed from its connections on a line corresponding with these. The flap included in its thickness a layer of fat and connective tissue. A second flap was then taken from below, to be laid upon

the other, in the manner previously determined upon, as already stated. An incision, encircling the lower half of the cavity, was then made completely down to the fascia, and at the same distance from its border as the base of the upper flap. A gutter was thus prepared for the upper flap, which was turned directly over the opening, and its overlapping edges were fitted and secured with metallic sutures into the groove below and around the borders. There were spaces of about half an inch between the approaching extremities of the upper and lower incisions, as it was thought unsafe to completely girdle the part. These spaces were made raw, by taking away a thin layer of the derm, and secured to the under surface of the flap. The thigh flap was now rotated and laid upon the raw mass to which it was also attached, by sutures, but it did not nearly cover the exposed surface. Upon reviewing our work it was found that such an enormous amount would be required to do this completely that the attempt was abandoned, and we concluded to trust to the cicatrization of the remaining uncovered portion. Warm water dressing was applied, and the patient was placed in bed. He lost a very small amount of blood, but was much exhausted from shock and the prolonged etherization, the operation having occupied about one hour.

Morphia was very freely given, the patient being accustomed to its use in large quantities; four grains of the sulphate or acetate in twenty-four hours, being an ordinary amount for him. A liquid diet, consisting of milk, soup, and soft eggs, was prescribed, and these in limited quantities. For two days the bladder was emptied by the catheter. The flaps held well until the 17th, when there was a slight gaseous and fecal discharge from beneath the edge. There was a curious dirty yellow slough covering the reverted raw surface, which looked very threatening at first, as it seemed to compromise the whole flap, but it proved to be only the fascia and fat, which gradually separated in a layer, and left a granulating, healthy surface on the raw face of the derm. The lateral flap gradually contracted and became firmly adherent near the anterior superior spine, and in no way served

the purpose that was originally intended. The spaces on the abdomen and thigh granulated rapidly and assumed a healthy appearance. The general condition of the patient varied from day to day in a very marked degree. His pulse rising at times to 140, and ranging between this and 100. He was very weak and indisposed to take nourishment, but finally reacted so as to relieve us of anxiety, as far as life was concerned, and enabled us to devote our chief attention to the local trouble. After the flaps had cleared themselves of the fat and fascia there was no further sloughing whatever, but everything assumed a healthy appearance.

On the 20th we began to experience the truth of our patient's observation, that *the thing* we would have to contend with would be the force of the intestinal gases, for, notwithstanding all means, by extra sutures, adhesive strips, &c., were taken to support the parts, the points of connection were gradually broken asunder, the flap was thrown up, and fecal matter escaped in large quantities. As the attempt to close the fistula appeared to be hopeless, we returned the abdominal flap into its original place, where it rapidly united and served very materially to diminish the granulating ulcers which were making a considerable drain on the patient's powers of restoration. After this the thigh surface healed rapidly, and by the 20th of December it was nearly well. Although the operation had failed in its object, yet some good arose from it. The opening was smaller, having contracted, owing to the free incisions around it; its edges were more uniform, and not surrounded by a gutter or depression as before, and the tissues afforded a good support for the various

### Mechanical Means

which were now resorted to. After consulting with Dr. Agnew, who attended the case throughout, with me, we determined to try the vulcanized rubber, and were greatly aided by the ingenuity of Mr. Kimball of this city. We at first fitted a section of a cylinder, made very smooth and light, directly into the gut, with its concavity inwards, thus

trying to substitute an anterior wall of rubber for the natural one. It was thus subjected to the motions of the intestine, and care was taken to secure it by strings fastened to the centre of the convex surface, upon which was soldered a small abutment, to prevent it from passing into the ascending colon. It was interesting to observe how well the gut tolerated this apparatus, and accommodated itself to its sides and borders. Various patterns were tried, and the plan seemed at first to promise complete success; little or nothing would pass the fistula, and the patient would have his bowels opened naturally at intervals of two or three days. But the uncontrollable difficulty was in the muscular power of the ascending colon and the pressure of intestinal gas. At times the superior section of the cylinder would be drawn upwards with great force, its complete passage into the bowel being only prevented by the abutment and strings used to retain it in position; then the gases would press out beneath its lower edge and force this part completely out, so that it was not uncommon at a morning visit to find everything lying out upon the abdomen in the midst of a fecal mass. Sometimes when the apparatus would retain its position for two or three days we were compelled to remove it on account of insufferable colicky pains experienced by the patient. As these were thus relieved almost immediately, there was no reason to believe in the existence of peritonitis. During the progress of these mechanical efforts, the patient was rapidly recovering general health. He was able to ride out, and could take long walks. Finally, a plaster cast of the cavity and its surroundings was taken by Mr. Kimball, and from this a regular plug, with flanges to rest on the abdominal wall, was made. This was then fitted into the part, and promised all that was hoped of it. The patient tolerated it so well that he soon went home, and shortly afterwards visited Europe. He returned in the summer of 1867. Dr. Agnew saw him and reports that his general health was very good, but that he had been obliged to abandon the plug apparatus, on account of alterations in the shape of the parts and the pain and inconvenience it frequently gave him. He was

now wearing a simple water-bag truss, which had the effect of retaining the fæces, until it was removed at daily intervals, when the usual amount would pass out at the opening.

Remarks.—One of the reasons of failure in this operation is, I think, that we attempted too much, on account of the fear of risking a single retroverted flap. Should a similar case occur, I should have no doubt about the expediency of an effort similar to the one just detailed, omitting any attempt to cover the raw surface by a second flap. Enough was proved to show, that there need be no fear of the exposed surface not granulating, and there is no more risk of sloughing, I think, than in an ordinary sliding flap.

Mr. Holmes, in the Medical Times and Gazette, February 1865, page 115, reports two cases of operations in children, one nine, and the other, two years of age, for extroversion of the bladder, performed in precisely the same manner, and with the same idea as in my case. One of these was successful, the urine was retained and passed at the urethra. The patient died a year after the operation. No details of a post-mortem examination are given. The other case was removed from the hospital and, I believe, subsequently died. Previous to these cases, Prof. J. Pancoast, of this city, operated for extroversion of the bladder by turning a flap, skin surface downwards, in order, if possible, to make an anterior wall to the viscus. The case did well for a time, but the patient died of another disease before a cure was accomplished. Operations for extroversion of the bladder afford a better chance of success than the same kind of procedure for the cure of artificial anus, where a wall of the bowel has to be replaced. The bladder may readily be kept empty by means of a catheter, and there is no gaseous pressure to contend with, as in the case of the bowels. This, in fact, is a much more formidable obstacle to success than fecal accumulation, and as yet I do not know of any means to obviate or lessen it. The triumphs of surgery have of late been so positive in the treatment of vesico-vaginal fistula, and the various forms of perineal injuries, involving the bladder,

urethra, and rectum, that we may yet hope for absolute success in our efforts to remedy the most pitiable condition of those who may be affected like the one whose case has been the subject of this paper.

This article was nearly finished when an operation was performed in the manner advocated above, by Dr. T. G. Morton, assisted by myself. A boy, 13 years of age, was admitted into the hospital for treatment for a small fecal fistula near the upper border of the left iliac region. He had been sick for about seven months. The early history of the case is obscure, but about three months after the first attack an abscess opened through the abdominal wall, and gas, together with a small amount of fæces and seeds of fruit, escaped. The fistula was small, and did not at all interfere with the regular action of the patient's bowels.

A sufficient time having elapsed to satisfy us that there was no prospect of a spontaneous cure by contraction, Dr. Morton performed an ordinary sliding-flap operation, and closed the opening by sutures. This was soon proved to be unsuccessful, the stitches giving way, and the opening was left as before. After the parts around had assumed a healthy character, Dr. Morton, on the 6th of November, 1867, dissected up a thick semicircular flap from above the fistula and made a deep gutter below it; then he freshened the surface between the ends of the incisions, precisely as in the manner described in the first steps of my case. The upper flap was turned over and secured by a number of hare-lip pins, into the lower incision. These pins were passed deeply, and between every pair a superficial silver suture was placed. Warm-water dressing was applied, and the patient placed in bed with his limbs flexed and supported by pillows.

By the 9th, three days after the operation, firm adhesions had taken place around two-thirds of the circumference of the wound. There was no appearance of fluid with fecal odor. All the pins were removed by the 11th, and the whole surface of the upturned flap presented a healthy granulating character, in no way to be distinguished from an

ordinary healthy ulcer. At this date, November 19th, everything continues favorable. There is no fecal odor in the discharge from about the edges of the wound. Cicatrization is going on rapidly; the boy's bowels act naturally, and altogether there is a fair promise of success.

The result of the case, which it will take some time to test, will be reported in our next number. If it should be successful, it must be remembered that the difficulties to contend with were trifling when compared to those in my case; if not, we will only have another illustration of the formidable nature of the affection and the almost uncontrollable obstacles it opposes to surgical success. One thing, however, is proved, and that is, in cases where we wish to turn the cuticular surface inwards, so as to take advantage of its superior resisting power, or to substitute it for mucous membrane, we need have no fear as to exposing the inner surface of the derm, for this will soon granulate and cicatrize as in ordinary healthy ulcers.

OBSERVATIONS

# ON THE ACTION OF NARCEIN.

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ONE OF THE PHYSICIANS TO THE HOSPITAL.

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Narcein is a remedy which is, at present, attracting a good deal of attention. Discovered by Pelletier in 1832, it has not, until very recently, been much used, chiefly because, after the experiments of Magendie, who injected several grains into the jugular vein of a dog without any marked effects, it was believed to be inert. But about two years ago Bernard, in the course of his examinations into the qualities of the different constitutents of opium, announced that narcein is the chief sleep-producing agent it contains, since, in the dogs on which he tried narcein, the most profound sleep was brought on. The result of the researches of the great physiologist concerning the action of the agent in animals was tested on man; and it has been asserted by not a few observers that in narcein we possessed a remedy which relieved pain, quieted irritation, and caused deep sleep, without occasioning the nausea, or headache, or constipation, which is so apt to follow the administration of the usually-employed opiates.

The value of an article having these properties is too evident to be discussed. If it be really what is claimed, it would, irrespective of superseding morphia and kindred preparations for ordinary purposes, be the remedy above all others for mania a potu, for the irritative cough of phthisis,

and for many states in which we wish to obtain just the influence which it has, and to avoid the consequences to which, unlike morphia, it does not give rise. To satisfy myself on these points, I tested its action in a number of cases with care, and with these results:

First, I employed narcein in one-fourth-of-a-grain doses to procure sleep in several tubercular patients, kept awake by the racking cough, and passing wretched nights. The opiates they took—for the most part the deodorized tincture of opium, Battley's solution, or a solution of morphia—were efficient, though the doses resorted to were comparatively large. One-fourth of a grain of narcein had no influence; one-half no more; and the effect of one grain, given in divided doses, was very doubtful. These observations were, on each case, three times repeated; the last trial was no more satisfactory than the first. Thinking that, perhaps, the previous continued use of the opiates rendered the patients not very susceptible to narcein, but unwilling, at the time, to give it in larger doses, I next employed it in a series of cases dissimilar to those alluded to, in having used any preparation of opium, only occasionally and in small amounts, or in not having used it at all. Moreover, the cases on which narcein was now tried were not like the ones mentioned, cases in private practice, but, being in the hospital, the action of the drug admitted of careful notice. I will give a summary of ten, watched both by my residents, Drs. Hare and Markoe, and by myself, premising that I have arranged them in groups, having reference not simply to whether or not anodynes had been part of their treatment, but also in accordance with the special properties which, when the narcein was given, it was intended to investigate.

Case I.—Alice D——, aged 22, was admitted into the hospital for hemiplegia, connected with constitutional syphilis. She improved decidedly under the use of cod-liver oil and iodide of potassium, but complained at times of pain on the paralyzed side. The latter part of February she was

troubled with sleepless nights. She had taken twenty drops of the deodorized tincture of opium, equal to about the same amount of laudanum, without producing sleep, and the next morning had headache. On the night of the 26th, not having slept for three nights, she swallowed one-half a grain of narcein, in solution, slept several hours, but had much headache in the morning. On the night of the 27th a grain was administered to her, divided in one-fourth-of-a-grain doses, given every hour, beginning at 8 o'clock. She slept from 12 P.M. to 6 A.M., and on the morning of the 28th woke up with headache. The respirations were 20; pulse was 100; she had a passage. On the night of the 28th she took a very small quantity of camphor-water, slept well, and has continued ever since to do so.

CASE II.—Jennie W——, 28 years of age, a highly hysterical woman, laboring under inflammation of the neck of the womb, complained, soon after her admission into the hospital, of pains in the muscles, like those of muscular rheumatism, though it is quite possible that they were due to muscular hyperæsthesia. The pains were severe in the evening, and, whether from pain or not, it is certain that she passed restless, sleepless nights. Yet sleep was easily produced by taking either laudanum in twenty-drop doses, or the same amount of a solution of bimeconate of morphia, or fifteen drops of Battley's solution, or a drachm of the officinal solution of morphia. Very moderate doses, therefore, answered the purpose; but the use of these remedies was invariably followed by nausea and headache the next day. To obviate this narcein was prescribed in one-fourth-of-a-grain doses, given in solution, but without any effect whatever. The narcein was increased, after several trials, to one grain and three-quarters; but, though the pain was reported as being somewhat lulled by it, the patient slept only a few hours. No narcein was now ordered for upwards of two weeks, when it was resumed in half-grain doses at night, without any decided result. One grain was administered in two doses on the evening of the 6th. The patient did not

get to sleep until early in the morning, and woke up feeling sick at the stomach, and with flushed cheeks and headache. Towards night of the 7th, one grain and a half was given; this was followed by similar effects. On the evening of the 8th, a very small quantity of camphor-water, less than one drachm, was administered. She slept about as well as on the two previous nights, and had no nausea in the morning.

On the 14th the narcein was again resumed, the nocturnal pains having in the meantime greatly lessened. At 8 P. M., the pulse was 108; temperature 98°; the respirations 28. She took three grains of narcein, given in lime-water and with ginger; and thus the nausea was greatly lessened. The drug produced sleep towards morning, lasting six hours. She exhibited on wakening no contraction of the pupils, had a free movement from the bowels; the urinary secretion was not interfered with. There was headache all day, with flushed face.

On the 15th, she took no anodyne at night, and did not sleep.

On the 16th she slept after taking forty drops of deodorized tincture of opium.

Subsequently she was placed on the use of Dover's powder and nitrate of potassa, and rested much better. On the 29th of March, it was noted that she had commenced to sleep well without taking anything, and this state of things lasted until she left the hospital.

In both these cases the sleeplessness was the main condition for which the narcein was given, for in neither did it appear that the pain kept the patient awake; it certainly did not do so when other anodynes were used. Over the sleeplessness the remedy exercised, as seen, but little influence. In the following cases I tested whether narcein was able to control irritation or spasmodic action, and to procure sleep while these or much pain existed.

Case III.—Alice B——, aged 32, admitted into the hospital February 2d, 1867, suffering from asthma and subacute bron-

chitis. She was very liable to attacks of asthma; had also feeble digestive powers. She improved very much until about the middle of April, when the disturbance in her breathing, as well as her gastric symptoms, again became troublesome, and she passed very restless nights in consequence chiefly of the embarrassed respiration. On the 19th, she was suffering much from headache, a sense of choking, and nausea, and had not slept for several nights. She took two grains of narcein in solution with muriatic acid and water at 8 P. M., the pulse being 120; temperature 99°; the respirations 20. About 10 o'clock she fell asleep, and slept for a few hours, but passed a restless night, feeling in the morning unrefreshed. During the night she was much annoyed by a sense of oppression and by wheezing breathing, both of which, indeed, existed before she took the narcein, but were afterwards increased. In the morning the face was slightly flushed; the pupils were not contracted; the pulse was 114; temperature 98½°; respirations 26; the bowels were moved.

On the 20th no anodyne was given; on the nights of the 21st and 22d she took forty drops of deodorized tincture of opium, which secured several hours' sleep, but she was subsequently kept awake by dyspnœa. Indeed, she was much in the same condition as after the narcein, except that she had more headache, and that the bowels were costive. The wheezing was on the morning of the 25th still encountered, and there were many dry râles. All opiates were then suspended and she passed much better nights. They seemed to increase the difficulty in breathing, and prevent her from sleeping.

Case IV.—Elizabeth M——, 31 years of age, a patient in the Pennsylvania Hospital, was admitted on the 11th of February, 1867, for severe hemorrhage from the lungs attendant upon diffuse tubercle. The attacks of hemorrhage lasted until the 19th, and were followed by harassing cough, which generally occurred in paroxysms, and which during the progress of her case proved a troublesome symptom.

Hydrocyanic acid, morphia, and deodorized tincture of opium, had some influence on the cough, but controlled, it was found, the paroxysms less than Hoffman's anodyne and camphor-water, or than Hoffman's anodyne and paregoric; and these mixtures, too, had less effect than chloroform in twenty-drop doses, which always allayed the irritative cough and procured quiet and often sleep for some hours. To test the effect of narcein on the annoying cough, most annoying at night, and on the restlessness, chiefly produced by it, the chloroform was suspended, and on the evening of April 5th, half a grain of narcein was administered to the patient. She did not sleep well during the night and coughed a great deal. Nor was the night of the 6th, when she took no medicine, a better one.

On the 7th, at 8.30 P. M., a grain of narcein was given. She did not get to sleep until one o'clock, and coughed considerably; had a passage in the night. In the morning the pupils were not contracted; there was no headache; the tongue was clean.

At 8½ P. M. on the 9th she took narcein again in a one-grain dose. "Never spent so restless a night; not a wink of sleep," was her own comment on its action—a comment corroborated by the night nurse. She was very sick at her stomach during the night and vomited a bitter matter; had, however, felt much nauseated prior to taking the narcein. The bowels were opened in the middle of the night. The cough was uninfluenced by the remedy.

On the 10th she took the deodorized tincture of opium with the occasional addition of chloroform, ten drops of the former at a dose, and about twenty of the latter, every four hours, commencing in the daytime. The effect on the cough was decided, and she slept better than she had for one week previously.

On the morning of the 11th the pupils were much contracted, and she had temporal headache; she took that day but two doses of the tincture alluded to, and very little chloroform; passed again a good night. And so the case continued, both the restlessness and cough favorably influenced

by the deodorized tincture of opium, or Battley's sedative solution, neither in large doses, and by chloroform.

CASE V.—James R——, a patient who was admitted into the hospital for severe facial neuralgia, which was greatly ameliorated by hypodermic injections of sulphate of atropia, at first $\frac{1}{40}$ of a grain every night, subsequently every second night. The atropia relieved the pain and procured rest, and prior to the administration of the narcein the neuralgia was much better, considered both as to violence and frequency of the attacks.

On the 7th of May, at 7.30 P. M., one grain of narcein was given. The pulse at the time was 88; respiration 22; temperature, measured in left axilla, 97¾°. At ten minutes past 9 o'clock pulse 96; respiration 24; temperature 97°. The sleep was disturbed. He did not sleep continuously, or indeed better than usual, but stated that he dreamed more; had as much pain as common. Passed, from 6 P. M. of the 7th to 6 A. M. of the 8th, nineteen and a half ounces of urine; there was no sweating. In the morning the pupils were not contracted; the tongue was moist; he had a movement from the bowels. Pulse 95.

From 6 A. M. of the 8th to 6 P. M. he passed fourteen fluidounces of urine; and from 6 P. M. to 6 A. M. of the 9th, eighteen fluidounces. He was not sleepy during the day; had in the evening his customary dose of atropia injected hypodermically, which relieved pain and enabled him to rest well all night.

CASE VI.—James D——, a seaman, in the hospital for chronic rheumatism, supposed to be of syphilitic origin. The pain was generally severe at nights, and at times he took an opiate to allay it, in the shape of a Dover's powder, or of morphia, from one-sixth to one-fourth of a grain.

On the 7th of May, at 7.30 P. M., one grain of narcein in solution was administered. The pulse at the time was 76; respirations 20; temperature 98½°. The man went to sleep after 10, got up in the morning at 6.30. He woke up several

times during the night, dreamed a good deal, and obtained as much sleep as usual, though no more; passed water as common with him once during the night, and perspired. The pains were uninfluenced. In the morning of the 8th at 8.35 pupils remained large; no headache or sickness at the stomach was present; the skin was moist; pulse 78; respirations 20; temperature 97¾°. Did not sleep during the day. At 7.10 in the evening the pulse was 80; respirations were 19; the temperature was 99½°. Little more than an hour afterwards he took two grains and a half of narcein in solution at one dose. He got to sleep at 11 o'clock; awoke at 6, and thought that he passed a better night than common, having no pain and waking up but once. His skin was moist during the night, as indeed it generally was. He passed water in the morning on wakening without the least difficulty; had no stool; the pupils were not contracted. Pulse 72; respirations 22; temperature 99°. Did not feel sleepy during the day of the 9th, excepting somewhat so in the morning, and had no pain. Slept well that night, seven hours and a half continuously, without taking any medicine; had no pain. In the evening of the 9th pulse 80; respirations 20; temperature 98°. The night of the 10th was not a good one. On the evening of the 11th he took ʒiij of the officinal solution of morphia; was, however, wakeful, and did not sleep much until about daylight; got up at 6½ to take his breakfast, vomited it, went to bed again, and slept until between 10 and 11 in the forenoon, had a headache all day, but a good night's rest the following night, sleeping from 10 to 6 o'clock in the morning.

Case VII.—Anthony K——, a patient affected with sciatica, and suffering at times much pain, took, at 7.30 on the evening of the 7th of May, one grain of narcein in solution with acetic acid. Got to sleep at 10, awoke at 2, and again at 5 A.M., his usual hour for waking. Did not sleep after this, nor was he sleepy during the morning. Neither nausea nor headache, nor contracted pupils; nor did he pass water as usual with him at night. Thought that, on the whole, he

had a better night, and was in less pain than commonly. At the time of taking the remedy the pulse was 72; respirations were 20; temperature was 98½°. At 8.55 on the morning of the 8th, pulse 76; respirations 21; temperature 97¾°; at 7.10 P.M. pulse 62; respirations 16; temperature 99°.

He took, the same evening, two grains and a half of narcein at one dose, and slept well, but was awake in the night twice, and woke rather earlier in the morning: "the pain somewhat easier than usual; no headache; pupils natural size, perhaps rather smaller than ordinary; skin not moist; pulse 62; respiration 16; temperature 97½°. There has been no action of the bowels for two days; had no difficulty in making water. He dreamt much. During the forenoon did not feel sleepy, but slept several hours in the afternoon. In the evening pulse 68; respiration 18; temperature 98½°."

He now took a small quantity of water slightly colored with permanganate of potassa, and slept from 10 P.M. to 6.50 A.M. of the 11th, waking twice, but sleeping as well as the night before, and having, he thought, less pain. On the night of the 11th, ʒiij of the officinal solution of morphia were given at 9 o'clock. The patient went to sleep at 11 o'clock; did not wake until 4 o'clock; fell asleep twice during the day of the 12th, and had headache.

In all the cases just reported anodynes had previously been used for some time, though by no means in large doses, and the extent of irritation or annoyance for which they had been employed was mostly considerable. Yet all were readily influenced by the medicines used prior to the administration of narcein. Still, considering that a rapid tolerance of the remedy is spoken of by several observers, and is mentioned by Bernard himself, even in the experiments on animals, it might be that this tolerance or difficult action existed in the patients tried, because they had been more or less accustomed to opiates or other narcotics. To test this I gave narcein to three persons: one who had used morphia only a few times, and was, as regards his general health, in a very good condition; the others, men so far convalescent that

they could be looked upon as well, and who had not made use of narcotics or anodynes of any kind.

Case VIII.—William H——, aged 21, sent to the medical ward in consequence of a renal calculus, suffered at times considerable pain in the back, especially on the left side, and in the testicles. The pain was always greatly relieved by hypodermic injections of morphia, one-fourth of a grain, which he had used for about a week, every second night, when it was determined to give him narcein. Whether he took morphia or not he was a good sleeper, dreaming, however, much. For five days before the administration of narcein he had very little pain in the back, and no hypodermic injection of morphia was resorted to.

On the 30th of April, at 9 P.M., he took one grain of Morson's narcein in solution. The pulse was 92; respirations 22; temperature 98¾°. He fell asleep about 11 P.M. and woke at 5 in the morning, his usual hour of wakening. His sleep, he thought, had been somewhat more continuous than common; he dreamt that quinine had been given to him. He did not perspire during the night, and made, according to his statement, the usual amount of water in the morning, but did not get up in the night, as he ordinarily does, to urinate.

The note of May 1st reads: "In the morning, pulse 94; respirations 24; pupils the same size; no headache; has some pain in the testicles. Not drowsy during day; felt as usual, and occupied himself all day, as usual, with playing checkers and walking about."

Case IX.—Robert J——, 20 years of age, admitted April 2d, 1867. Has been taking tincture of chloride of iron, with chlorate of potassa, as he came in with spongy gums and in a general scorbutic condition; had pain in the back, rather worse at night; no renal trouble.

April 22d.—Still has some pain at night, but is improving much in general condition. Gets to sleep about 12 P.M., and sleeps till 5 or 5½ A.M., not being awakened by pain. Is

in good physical condition; tongue clean, bowels regular, appetite good, slight headache after meals, but not on first awakening, pupils normal in size, urine passed freely on going to bed, restless for an hour or two before getting to sleep, dreams every night, dreams being pleasant and of familiar objects. To-night, takes camphor-water twenty drops, with two drops of compound tincture of cardamom at 8 and 10 P.M. At 8 P.M. temperature, 100½°; pulse, 100; respirations, 28.

23d. Slept rather poorly, did not get to sleep till 2 A.M. and slept till 5½. Following night, after taking same dose, got to sleep early, 9 P.M., and slept all night long until nearly 6 A.M., feeling refreshed and well; felt well all day.

Morning, 12.30 P.M. temperature, 98½°; pulse, 68; respirations, 28; skin cool. Evening, 6 P.M. temperature, 98°; pulse, 76; respirations, 20.

24th. At 8½ P.M. took one grain of narcein (Morson's): got to sleep at 9 and slept till 5½ A.M., having pleasant dreams; had some pain in back on awakening, no headache nor nausea, pupils uninfluenced, possibly a little smaller; appetite as usual, very good; awoke of his own accord; noticed no difference whatever in character of sleep; passed water as usual; is of opinion that he has been sleeping better for two or three nights past. He left the hospital during the morning to return to his ship.

Case X.—Frederick F——, a young man, convalescing from a malarial fever and sleeping well, generally awakening once or twice at night to make water. In the evening of the 8th of May, at 7.10 P.M., the skin felt cool, pulse was 108; respirations, 20; temperature, 100°. He took at 8.30 two grains and a half of narcein. At 10 P.M., pulse, 98; respirations, 18; temperature, 99°. Note says: "Did not get to sleep until after 10 o'clock, a little later than usual; woke at 4 A.M., and has been awake since. Dreamt, which is not his habit; thinks he may have slept rather sounder than commonly, and an hour longer; skin moist, no headache, bowels not moved. Passed, from 6 P.M. to 6 A.M. this morning, 28

ounces of urine. Pulse at 7.30 A.M. 106; respirations, 18; temperature, 98°. Pupils rather small, felt sleepy during the morning."

May 9th. Pulse in the evening 82; respirations 20; temperature 99°; urine passed from 6 A.M., to 6 P.M. 20 fluid ounces; slept in the afternoon for about three hours, somewhat more than is his habit; took at night-time a teaspoonful of water colored with permanganate of potassa. Had a good night, getting up, however, three times to make water. Urine passed, from 6 P.M. to 6 A.M. of the 10th, 36 ounces. On the 10th did not sleep during the day. Had a good night, got up twice to make water, took the permanganate again. Urine passed from 6 A.M. to 6 P.M., 14 fluid ounces. On the night of the 11th, f℥iij of the officinal solution of sulphate of morphia were given; he slept very well, waking up once to make water.

In this case, as well as in others in the series, a mixture having no properties either in consequence of the minuteness of the dose, or merely colored by a small quantity of permanganate of potassa was given, sometimes before and sometimes after the experiments with narcein. The patient generally knew that he was taking something to make him sleep, but he did not know when the agent possessing special qualities was administered, and when not; nor, where it could be avoided, was he impressed with his taking the article prescribed, either to relieve the pain or to procure sleep, but often believed it to be given for some other purpose. Again he was always watched before, and for nights after, the narcein was employed, and the observations were repeated. One night's sleep, indeed, is, in those who have wakeful nights, no test of a remedy. Often a person may not sleep for several nights, and the next pass without taking anything, a good one; a fact to which in estimating the action of any narcotic we ought to pay attention.

When now we look at the general results arrived at in this investigation concerning the action of narcein, we find this:

On the skin it produces but little effect, far less perspiration than morphia or the other ingredients of opium.

It does not, as a rule, give rise to headache, or to nausea and vomiting, and loss of appetite; but it is an exaggeration to say that these effects do not occur. Moreover, they seem to happen in women more constantly or markedly than in men. It does not constipate, may even relax the bowels.

It is not an excitant; yet the face is not uncommonly flushed after its use in decided doses. Scarcely any action on the pupils is observable.

No marked influence on the temperature, respiration, and pulse is perceptible subsequent to its employment. So far as noticed it somewhat lowered the temperature, and slightly lessened the pulse; the latter, however, not constantly.

No such decided effect as has been ascribed to it on the urinary function was met with. In so far as it was seen to have any action it seemed to diminish the tendency to frequent urination, rather than to suppress the amount of secretion. (See Cases V and X, in which the quantity was measured every twelve hours.)

And with reference to its soporific and anodyne properties it appeared, in doses in which morphia is prescribed, totally destitute of either; and in larger doses uncertain, and often palpably inert. It does not allay irritation.

These results are certainly not what I expected when I began this inquiry, and it is difficult in their light to understand the statements that have been made of the influence of narcein on disease; for instance, the eulogy of Behier of its action on the cough attending pulmonary tubercle;* or the good results of Laborde† in hooping cough; or the cure of tetanus by one-sixth of a grain every two or three hours, given by Kersch.‡

An explanation of the unsatisfactory effects that were obtained in the cases I have reported may suggest itself in the mode of preparation of the article and in its character.

* Bulletin de Thérapeutique, or Annuaire de Thérapeutique, 1865.

† Gaz. des Hôpit., 1865, No. 38.

‡ Schmidt's Jahrbücher, No. 4, 1867.

But as regards the mode of preparation and administration every precaution was taken. It was always given in solution, prepared generally by the gradual addition of dilute muriatic acid, so as to avoid the blue precipitate and possible decomposition which ensue, when strong acid is dropped into narcein and water. The results of no experiment are here adduced which was not made with a perfectly clear solution procured by the use of dilute muriatic acid, or acetic acid, generally of the former. Hypodermically the article was tried, but only a few times, for the local irritation produced is very great, chiefly in consequence of the acid necessary for a perfect solution.

With reference to the character of the narcein employed, I may state that the production of the laboratories of three chemical firms was used—all of excellent repute—of Tromsdorf in Prussia, imported through the French house of Menier in Paris; of Morson, in London, and of Powers and Weightman in this city; and I could not perceive that the medicine differed in the least in its action. The narcein of Powers and Weightman, which was chiefly tried, was an admirably looking specimen, consisting of very delicate silky needles. It was prepared with much care, and was subjected by them to the published chemical tests before it was issued. Our accomplished pharmaceutist at the Hospital, Dr. John Conrad, examined chemically the article they furnished us, and which I had recourse to, and it answered well to the description which Robertson* gives of narcein. It was only very slightly soluble in cold water; indeed one part was not even soluble in 375 parts, which is the proportion mentioned in the U. S. Dispensatory; and in this want of solubility it was unlike the narcein used by Bernard,† who states that it is more soluble than the muriate of codeia or of morphia, which he employs in solution of 5 grammes of the salt to 100 of distilled water. In boiling water the narcein I experimented with was soluble, but it recrystallized from the solution when cold. It was insoluble in ether, and

* Bull. de Thérapeutique, September, 1865.

† Annuaire de Thérapeutique, 1865, p. 5.

sparingly soluble in cold alcohol, but soluble in hot alcohol, from which it did not recrystallize when cold. The watery solution was not turned blue by chloride of iron; a very slight milkiness ensued upon the addition of tannic acid. The addition of a few drops of tincture of iodine to a watery solution caused an abundant blue precipitate, which redissolved upon boiling. Acetic acid dissolved the narcein somewhat slowly; strong nitric acid turned it yellow, with a copious evolution of gas; sulphuric acid turned it into a brownish-yellow without the appearance of gas bubbles.

This narcein then answered to the tests supposed to denote purity; and either these tests are insufficient, or the pure article is of little value. In the former case it is useless for physicians to prescribe a remedy which professional chemists cannot themselves rely upon furnishing pure. And as regards the comparative inertness of the supposedly pure substance, the question suggests itself whether it be possible that some of the narcein that has been used and so highly lauded, may not have been admixed with the other principles in opium; may it not, for instance, have contained codeia? Narcein exists only in very small proportions in opium, and is difficult to obtain: the treatment that it is subjected to in purifying it makes it highly improbable, I am informed by Mr. Weightman, that morphia should be associated with it; but narcein and codeia crystallize together much more readily than narcein alone; and in purifying narcein it is attended with trouble to separate the codeia. If this be the true solution of the matter, or if it be found that some other principle be combined with the narcein, it will then also be found that the more impure this costly article is, the greater will be its effect.

# REVIEW

OF

# THE LIGATIONS OF LARGE ARTERIES

AT THE PENNSYLVANIA HOSPITAL BETWEEN THE YEARS 1835 AND 1868;

INCLUDING SEVERAL HITHERTO UNPUBLISHED CASES, AND A DETAILED REPORT OF A LIGATION OF THE LEFT INTERNAL ILIAC ARTERY.

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Aneurismal disease has been rather an unusual affection in the Pennsylvania Hospital, as may be inferred from the statistics, covering a period of 115 years, which are here presented. The rarity of cases requiring ligation of large arteries for aneurism or otherwise during the past thirty years, has in fact been repeatedly a matter of comment among the medical officers of the Hospital.

From the establishment of this charity in 1752 to the present time, of 80,177 patients admitted, 105 only of "aneurism and varix" have been recorded. A large number of these cases have been of disease involving the aorta; not a few were those in which the smaller vessels had been the seat of the disease; while formerly, cases of varicose veins were occasionally tabulated under the same head.

From 1752 to 1836, a period of eighty-four years, of 33,431 patients received, twenty-two only suffered from aneurismal disease, while from 1836 to 1867, a period of thirty-one years, of 46,746 admissions, eighty-three cases are recorded.

From 1852 to 1864, not a single instance of deligation of any large vessel occurred, showing the comparative rarity during this period in hospital practice in Philadelphia of aneurisms requiring operative treatment.

The first case of aneurism was received into the Hospital in 1755. The most recent one entered within a few weeks past on account of a spontaneous aneurism involving the left gluteal region and measuring twenty-six inches around the pulsating base. In this case I tied the internal iliac artery, the operation being the first and only instance of ligation of this vessel in Philadelphia.

*Arteries Ligated.*—Of the seventeen major ligations performed since 1836, the subclavian was ligated once; the common carotid five times; the common iliac once; the external iliac three times; the internal iliac once; and the femoral on six occasions.

*Disease or Injury.*—Fifteen of the operations were for the relief of aneurismal disease, one for pulsating tumor of the head of the tibia, and one for hemorrhage following a wound of the neck.

*Date of Operation.*—Nine of the ligations occurred between 1836 and 1852, and the remainder since 1864.

*Mortality.*—Of the seventeen operations, three of the carotid and one of the external iliac ligations terminated unfavorably; congestion of the brain, hemorrhage, and serous effusion in the chest in the former, and peritonitis in the latter, being the immediate cause of death. Of these fatal cases, it is, perhaps, worthy of note that the patients were all in advanced life, their ages being 59, 46, 51, and 57, and three of them were not the most promising subjects for operative treatment. In the three instances in which the carotid was the vessel ligated, a traumatic aneurism of the carotid, hemorrhage from a gunshot wound of the neck, and an aneurism of the innominata, represent the lesions for which the opera-

tion was undertaken. In the external iliac ligation, which proved fatal from peritonitis, this vessel was tied for an aneurism involving the profunda and femoral above the site of a femoral ligation twelve years previously.

*Return of Pulsation.*—Five instances are recorded in which pulsation returned after the ligation.

In Case XV, an external iliac ligation for aneurism of the profunda femoris, a slight pulsation returned within a few moments after tightening of the ligature, but disappeared within twenty-four hours.

In Case VIII, a carotid ligation, pulsation returned on the twelfth day and disappeared on the thirty-sixth.

In Case II, where the femoral was ligated for a supposed aneurism of the head of the tibia, pulsation returned after the lapse of some months.

In Case X, an orbital aneurism, the carotid having been ligated, the thrill and noise in the head, with pulsation of the eyeball, returned after ten hours; then continued feebly for several days, and finally subsided.

In Case XVII, recently under treatment, the gluteal tumor became painful about the twelfth day, and on careful examination, pulsation was detected. This continued, at intervals, during two weeks, and then ceased to be perceptible.

*Suppuration of the Sac.*—In three cases suppuration of the sac occurred. In Case VII, an inguinal, and in Case XI, a femoral aneurism, with no serious trouble following.

In Case XII, an axillary aneurism, with ligation of the subclavian, hemorrhage after hemorrhage occurred with the discharge of the contents of the tumor, the patient recovering after a ligation of the subscapular artery, and amputation of the arm.

*Separation of Ligature.*—The earliest separation in the carotid ligations occurred on the twelfth day; the latest on the twentieth.

The ligature on the subclavian came away on the eighteenth day.

In the iliac ligations, the shortest interval before separa-

tion was seventeen, and the longest, thirty-five days in duration.

In the femoral operations, the shortest of these intervals was eight, and the longest, twenty-six days.

Considering the magnitude of many of the vessels ligated, as well as the very serious nature of the cases requiring operation, the results have been very satisfactory. Several of the cases having been previously reported, a brief abstract has been deemed quite sufficient in this place. The ligature of the common iliac, in 1842, represents the sixth successful ligation performed upon this great vessel.

Of the carotid ligations, three out of five terminated fatally; of the external iliac ligations, two out of three recovered; and of the six femoral operations, all did well.

Case XV illustrates a rare form of aneurism, involving the profunda femoris, in which case the external iliac was ligated. Few authorities mention aneurism in this locality; Erichsen, however, refers to the affection as "of extremely rare occurrence," he having seen only one example, and that discovered after death.

The last case operated on, and recently in the hospital, is also of very unusual interest, being one of aneurismal tumor of the left gluteal region, spontaneous in character, for the relief of which the internal iliac artery was successfully tied. This, the first operation of the kind in the city, is probably, following Mr. Syme, who reports his case in 1861 as the eighth, the ninth on record. On two occasions, however, during our late war, this vessel was unsuccessfully ligated for hemorrhage following gunshot wounds.*

Case I.—1836. *Varicose Aneurism; Ligation of the Primitive Carotid; Death.* By Jacob Randolph, M.D.

Robert Reese, a mariner, United States, aged 59, was admitted April 14th, 1836, on account of a tumor in the upper part of the neck, following a penetrating wound accidentally inflicted. On examination a varicose aneurism was observed.

* Circular No. 6. S. G. O. 1865.

Ligation of the common carotid was performed May 26th, 1836. The patient died the day following from congestion of the brain.

Case II.—1838.* *Tumor on the upper and outer part of the Leg, simulating Aneurism; Ligation of the Femoral Artery; supposed cure; return of the patient, thirteen months after operation, with a tumor of greatly increased size, occupying same situation; amputation of the thigh; recovery.* By George W. Norris, M.D.

James Russell, aged 32, was admitted August 10th, 1838, for a pulsating tumor on the outer and upper part of left leg; the disease was judged to be an aneurism on the anterior tibial or one of its branches.

September 20th. The tumor much increased in size, and its pulsations much stronger.

22d. Femoral artery ligated.

October 9th. Ligature separated.

31st. Tumor much less in bulk, and no movement can be felt.

On the 7th September, 1839, eleven months after his dismissal, Russell returned, with a very considerable tumor; pulsating, and occupying the upper part of the leg.

October 16th, amputation of the thigh was performed; the limb was very vascular, nineteen arteries requiring ligation. During the night secondary hemorrhage occurred, to the amount of twenty-five ounces, and five additional ligatures were applied.

December 18th. Stump sound. On dissecting away the skin and muscles from the tumor its greatest circumference was found to be 13½ inches; the popliteal vessels and nerves lay over the back part of the tumor, but no branch communicated with the interior. There was no deviation from the ordinary size and structure of the popliteal vessels. The bony shell was from four to five lines thick where it joined the shaft of the tibia, and appeared to consist of a globular

* Am. Jour. Med. Sciences, vol. xxv, p. 257.

expansion of the external table of the tibia, while the internal table, the intermediate spongy structure, and the medulla were continuous with the cavity of the tumor and the matter contained in it, which was composed of a soft, solid, brain-like substance; under the spot formerly occupied by the supposed aneurismal tumor, but within the present bony parietes, was found a clot about $2\frac{1}{2}$ inches long by $3\frac{1}{4}$ inches in thickness, and firm under pressure.

CASE III.—1841.* *A case of Inguinal Aneurism treated successfully by a Ligature to the External Iliac Artery.* By Edward Peace, M.D.

John Erwin, a mariner, aged 28, was admitted July 17th, 1841, with inguinal aneurism of the right side, which seemed to have its origin from a fall during a wrestling match; two months after this he noticed a small tumor in the groin, which was pulsating in character, extending about an inch above Poupart's ligament, and three and a half below it, being four inches in its transverse diameter.

July 24th, 1841. The usual operation was performed; the external iliac artery being tied, with immediate cessation of all pulsation, and without subsequent unfavorable symptoms.

August 3d. Wound healthy; aneurism smaller and firmer; circulation in the limb quite normal.

24th. Ligature came away to-day, being the thirtieth day since the operation.

November 24th. Discharged from the hospital, and able to go to work.

CASE IV.—1842.† *External Iliac Aneurism successfully treated by Ligature to the Common Iliac Artery.* By Edward Peace, M.D.

Israel Jones, married, aged 39 (U. S.), a laborer in a quarry at Leiperville, was admitted August 22d, 1842, for an inguinal aneurism of the right groin of five months' standing.

* Med. Examiner, April 9, 1842, p. 225.

† Am. Jour. Med. Sciences, 1843.

The patient originally felt something give way whilst lifting a heavy stone for a wager; soon after, a hard tumor, about the size of a filbert, made its appearance, which became as large as a walnut in the course of a month, and continued to increase until the end of the fourth month, when it attained its maximum growth. There was pulsation about the third or fourth week. About the beginning of the fourth month numbness and pain commenced in the tumor, and extended along the anterior portion of the thigh.

The tumor was large and irregularly hemispheroidal, and was at least $5\frac{1}{2}$ inches in both vertical and transverse diameters; it appeared to involve nearly all the right external iliac with some two inches of the femoral.

August 29th, 1842. The common iliac was taken up about half an inch above the bifurcation. Pulsation and pain in the tumor ceased the moment the artery was tied; the capillary circulation was feeble until the sixth day. One half the wound united by first intention, and the whole wound, except the sinus occupied by the ligature, cicatrized within the first two weeks. The ligature came away September 27th, the thirty-fifth day. October 8th, patient discharged well.

On the 13th of November, the following year 1843, this patient was readmitted for hemorrhage consequent upon the rupture of an aneurism which formed rapidly at a point lower down, and entirely beyond the seat of the original disease of the previous year. Hemorrhage after hemorrhage followed, and gradually terminated the patient's existence on the twelfth day, November 24th, 1843. This patient left his body by will to Dr. Peace; the limb was injected and dissected, and demonstrated beautifully the collateral circulation supplying the extremity.

CASE V.—1844. *Ligation of the Common Carotid for hemorrhage. Died.* By Edward Peace, M.D.

Charles La Serre, a clerk, aged 46, was admitted October 15th, 1844, on account of a gunshot wound of and behind the right jaw. Eight days after the injury, hemorrhage occurred, and the common carotid was ligated. The ligature sepa-

rated on the twelfth day, but on the thirty-first day the patient died from recurring hemorrhage.

CASE VI.—1846. *Popliteal Aneurism; Ligation of the left Femoral Artery. Cure.* By George W. Norris, M.D.

Jacob Short, a negro, coachman, aged 59, was admitted April 9th, 1846, with an aneurism of the left popliteal artery of six months' duration.

April 22, 1846.—The femoral was tied and the ligature separated on the twenty-sixth day. Discharged cured June 6th.

CASE VII.—1848.* *Inguinal Aneurism; Compression; Failure; Ligature to the External Iliac Artery; Cure.* By George Fox, M.D.

James Sparks, aged 24, a native of Ireland, was admitted August 29th, 1848, with an aneurismal tumor of the right groin.

During the previous May he had first noticed a swelling in the groin. When admitted, the tumor extended about an inch and a half above Poupart's ligament, and four below it. Although the pulsation and thrill were strong, it could be almost emptied by pressure. Manual compression was kept up continuously for nearly four days and nights. Instrumental compression was then applied, and abandoned only after a faithful trial, when it was determined to tie the external iliac.

October 11th. The external iliac was tied in the usual manner; pulsation in the tumor ceased immediately; some abdominal pain followed, and the sac suppurated. The ligature separated on the seventeenth day. December 4th, wound cicatrized, and no discharge from the sac since the 30th ult.

December 21st, left the Hospital well.

July 4th, 1849, perfectly well.

CASE VIII.—1848.† *Carotid Aneurism; Ligation of the Common Carotid; Cure.* By George Fox, M.D.

Francis Wright, colored, aged 41, was admitted October

* Am. Jour. Med. Sciences, 1849, vol. xviii, p. 377. † Ibid., p. 381.

12th, 1848, with an aneurism of the right carotid artery, which was first noticed four months before, just below the angle of the lower jaw. When admitted, the tumor measured 3½ inches in length and 2½ in breadth, extending down the neck to within 1½ inches of the clavicle; it had marked thrill and pulsation.

21st. Common carotid ligated below the omo-hyoid; all pulsation ceased.

November 1st. Pulsation in tumor observed.

9th. Ligature separated, being the twentieth day; tumor less in size.

25th. No pulsation, and wound united.

December 9th. Discharged cured.

July, 1849. Patient examined, and no vestige of the tumor found.

Case IX.—1852. *Popliteal Aneurism; Ligation of the Right Femoral at Apex of Scarpa's Triangle; Cure.* By George W. Norris, M.D.

George Rowland, colored, aged 40, a jobber, was admitted December 21st, 1852, with popliteal aneurism, which appeared after a very severe strain. The tumor had grown rapidly. Ligature was applied to the femoral, and separated on the twenty-first day. The patient eloped from the Hospital, February 3d, 1853. This patient was afterwards readmitted, August, 1867, with inguinal aneurism, occupying the profunda and femoral arteries, for which ligation of the external iliac was performed without success, as it was followed by fatal peritonitis on the third day after the operation. (See Case XV of this report.)

Case X.—1864.* *Aneurism of the Ophthalmic Artery; Ligation of the Right Common Carotid; Cure.* By Thomas G. Morton, M.D.

Mrs. Parker, aged 36, was admitted into the Hospital December 3d, 1864. When two months pregnant with last

* Am. Jour. Med. Sciences, April, 1865, p. 318.

child, now eight weeks old, she was awakened from a sound sleep by what she described as the "report of a pistol" over her head; but was persuaded that it was only a dream. A peculiar sensation in her head with a slight purring noise was then developed, and vision soon became defective in the right eye. During pregnancy these symptoms increased; vision was much impaired; strabismus with diplopia supervened; prominence of the eye became quite marked; and during the last month of utero-gestation the globe was pushed upwards as well as forwards, the supra-orbital and nasal vessels became very turgid, and the tissues about the orbit assumed a dark hue. Seven weeks after confinement I was consulted, and found the eye very prominent, strabismus, pupil dilated, vision very imperfect, and general congestion of the orbital vessels; the eyeball pulsated strongly, which could be easily seen as well as felt; a distinct aneurismal thrill was perceptible all over the head, and could be heard at some distance from the patient; this bruit was loudest at the right temple; pressure upon the carotid effectually controlled all sound and pulsation.

December 4th. Ligated the common trunk of the right carotid above the omo-hyoid, the patient being fully etherized. On tightening the ligature the thrill in the head and the pulsation of the globe entirely ceased; 5 P. M. pulse 72, some headache, dryness of throat; 9 P. M. slight thrill heard in the temple.

5th. Continued headache on the left side; pulse 100.

6th. Had a convulsion last night, but slept comfortably since.

7th. Vision much improved since operation; pulse 88.

21st. Ligature withdrawn, being the seventeenth day since the operation.

28th. Left the city for her country home; wound closing; absence of all the previous symptoms.

January 30th. Qute well.

Subsequent history, November, 1867. This patient (now three years since the operation) is in the eighth month of

pregnancy and enjoying excellent health; no evidence of any former trouble; normal acuteness of vision.

Case XI. 1865. *Aneurism at lower part of the Thigh; Ligation of the Femoral Artery; Suppuration of the Sac; Cure.* By Thomas G. Morton, M.D.

John Donahue, a mariner, aged 26, a native of Ireland, was admitted, March 9th, 1866, with an aneurismal tumor of considerable size. It was rather flat, six inches in length and five in breadth, lying over the lowest portion of the artery just as it passes the tendon to become popliteal. The tumor was compressible, and presented a moderately distinct expansive pulsation and a feeble bruit.

The earliest symptoms complained of was pain, then stiffness and swelling of the limb, with the gradual development of a tumor, which was rather harder than usual on account of the distension under the fascial covering.

March 28th. Ligature applied to the femoral artery at the apex of Scarpa's triangle, with immediate cessation of sound and pulsation. During the first few days the wound looked well, but then became sloughy; a chill announced erysipelas, with deep formation of matter; pain extended down the limb; the sac became soft and fluctuating, darkened in color; externally hot and painful, thus rendering evident extensive suppuration.

At the end of the second week the wound became healthy, and suppuration being well established in the tumor a free incision was made, which gave vent to a great amount of broken-down clots with pus. The ligature separated on the sixteenth day. There was a free communication between the sac and point of ligation, and pus from the suppurating sac could readily be forced along the course of the artery to the wound of operation.

August 18th, 1865. Patient discharged, perfectly well, and soon after resumed his old vocation as a seaman.

CASE XII.—1866.* *Axillary Aneurism; Ligation of the Left Subclavian between the Scaleni; Suppuration of the Tumor; Hemorrhage on the forty-third day; Gangrene of the Limb; Continued Hemorrhages; Ligation of the Subscapular Artery in the Axilla; Amputation of the Arm at the Upper Third; Hemorrhage on the sixty-seventh day from the Circumflex Humeri Arteries; Removal of Humerus at the Joint. Recovery.* By Thomas G. Morton, M.D.

Francis McKeon, aged 51, a stone-mason, was admitted November 7th, 1866, with a very formidable aneurismal tumor, which filled up the axilla on the left side. The disease had been increasing for several months. When received into the Hospital the tissues covering the tumor were so attenuated that bursting seemed imminent; there was a strong pulsation with marked bruit, and with each pulsation the shoulder was considerably elevated; the pain about the shoulder was intolerable, and there was entire loss of sensation and motion in the limb, which was double the normal size.

November 14th. Ligated the left subclavian in its second part, owing to the encroachment of the tumor. Ligature came off on the eighteenth day, and the wound of operation was closed on the thirtieth day. Suppuration of the tumor followed, with a violent hemorrhage on the 27th of December, the forty-third day; between this date and the 8th of January, a period of thirteen days, ten hemorrhages occurred in succession, which only ceased after a ligature had been thrown around the subscapular artery in the sloughing axilla. Violent chills with exhausting sweats were of more than daily occurrence, and gave every indication of pyæmic involvement.

On the sixty-seventh day sloughing of the tissues about the head of the humerus having opened the arteries, a violent and almost fatal hemorrhage occurred, until Monsels salt and pressure controlled the flow. The vascular system, after the first hemorrhage, was so drained of blood, that the

* Am. Jour. Med. Sciences, July, 1867.

limb, all along but feebly supplied, became gangrenous, the line of demarcation forming at the upper third of the arm.

As soon as the patient could bear the operation, the desiccated member was removed, by cutting through the dead tissues, close to the living, and the bone a little lower down; subsequently the remaining portion of the humerus, which was destroyed in its entire extent, was excised at the joint.

The patient made a good recovery, and was discharged, cured, March 9th, 1867, one hundred and fifteen days after the ligation.

*Subsequent History.*—December, 1867. This patient's general health has been improving ever since his discharge. He is at the present time able to do ordinary work. When he left the Hospital the tissues forming the flap were rather in excess, but have since been absorbed, and the stump now presents a much more flattened and shrunken appearance, and the shoulder is rather more elevated. The plate (A) gives a very correct idea of the position of the shoulder, and the shrunken appearance of the stump, as well as of the line of incision made in the removal of the humerus at the joint.

CASE XIII.—1866. *Femoral Aneurism; Ligation of the Femoral Artery; Cure.* By Addinell Hewson, M.D.

William Moultrie, colored, aged 42, a barber, was admitted July 14, 1866, for an aneurismal tumor involving the lower portion of the femoral artery, which was quite large and of four months' duration; the usual symptoms of aneurism were present.

Ligature was applied at the apex of Scarpa's triangle, and separated on the twenty-first day.

The patient was discharged quite well, September 27th, 1866.

October, 1867. He is in good health and enjoys perfect use of the limb.

A

CASE XIV.—1867. *Aneurism of the Innominate Artery. Ligation of the Common Carotid; Died.* By Addinell Hewson, M.D.

John Granfield, a mariner, aged 51, was admitted March 3d, 1867, with aneurism of the innominate artery. Ligation of the common carotid was performed March 19th, 1867. The patient died on the twelfth day from serous effusion in the chest. A full report of this case will be found in the present volume of Hospital Reports.

CASE XV.—1867. *Aneurism of the Profunda and Femoral Artery, appearing fifteen years after a Ligation of the Femoral for Popliteal Aneurism; Ligation of the External Iliac Artery; Died.* By Thomas G. Morton, M.D.

George Rowland, colored, aged 55, born in Delaware, a jobber by profession, was admitted August 12, 1867, presenting a strongly pulsating tumor at and just below Poupart's ligament; fifteen years previously he was a patient in the Hospital with popliteal aneurism (see Case IX), the femoral having then been successfully ligated by Dr. Norris at the apex of Scarpa's triangle. He remained quite free from any trouble until the spring of 1867, when after a severe strain in lifting a piano, he experienced considerable pain in the groin, and perceived a tumor, which increased with rapidity. The tumor was pulsating in character, with a marked bruit, and being about the size of a large orange, it filled up the groin and encroached upon the brim of the pelvis. Whether the main artery alone or the profunda was diseased could not be determined, but the fact that the femoral was obliterated by previous operation, rendered it highly probable that the profunda was involved. Below the old cicatrix no pulsation or vessel could be found. August 13th, ligation of the external iliac was performed, the ordinary incisions being made, and no difficulty was experienced in the operation. After tightening the ligature a slight pulsation returned within a few minutes, but the tumor rapidly diminished in size, with disappearance of the pulsation.

Within twenty-four hours symptoms of peritonitis were evident, which quickly ran into a fatal termination during the third day after the operation.

*Post-mortem.*—General peritonitis.

Dissection of thigh. Corresponding to point of ligation (operation of 1852), the femoral had been entirely obliterated for at least one and a half inches, that portion having been converted into a thick fibrous cord; the femoral below this was dilated and much thickened, the coats of the artery being puckered up in folds and atheromatous (Fig. 1). Above the obliterated portion, the artery for some distance was healthy and laid upon and formed the back wall of the aneurismal tumor (see Fig. 2); but higher up and opposite the profunda the anterior portion of the femoral was much dilated, and formed a part of the front and inner wall of and communicated with the aneurismal tumor. The dilatation of the profunda extended down that vessel for an inch and a half, involving its entire calibre, and formed the outer and under walls of the sac. The aneurismal disease had evidently been developed at the origin of the profunda, and implicated a part of the main vessel in its anterior wall, the posterior portion being undilated throughout its entire course. The profunda in its entire extent had become aneurismal, the sac being almost filled up with laminated clot. The ligature was applied two inches above the origin of the epigastric, which, as well as the circumflex ilii, was much enlarged. A small clot had formed just above the ligature, and none below it; although above and below a diffused clot, covering and closely adhering to the side of the vessel, was well marked. The inner coat of the artery at the point of ligation was puckered up, and by projecting into the vessel above and below produced a teat-like eminence, evidently due to the effect of the tightening of the ligature.

The femoral and external iliac veins were normal in size and structure, the former not having suffered from the femoral ligation, fifteen years previously.

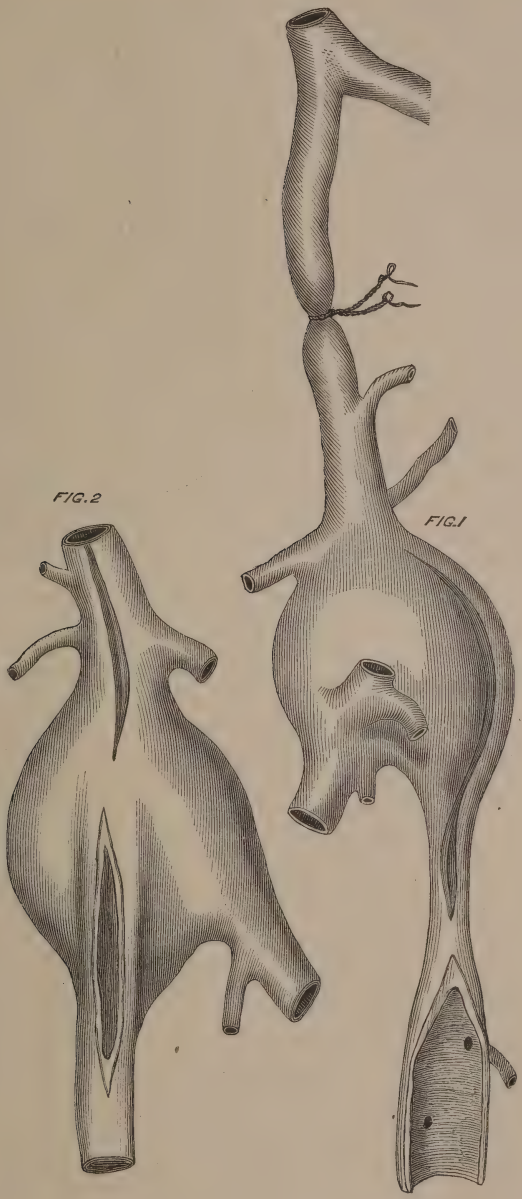


FIG.2
FIG.1

Case XVI.—1867. *Arterio-venous Aneurism of the Thigh from a penetrating wound; Ligation of the Femoral Artery and Vein; Recovery.* By Thomas George Morton, M.D.

William Emmons, aged 21, was admitted August 8th, 1867. While sitting on his door-step, with the knees well drawn up, he had received a stab from the right side, the knife entering the postero-lateral aspect, and taking a course upwards and inwards, emerged an inch below the apex of Scarpa's triangle.

Syncope from profuse hemorrhage soon ensued; the bleeding was arrested by pressure, and after a few hours' interval the patient was brought to the Hospital thoroughly drained of blood and in extreme prostration.

On examination the next day, the anterior and posterior tibials were found pulsating rather feebly, but the limb was warm, and as no further hemorrhage had occurred the wounds were not examined.

The limb was frequently inspected to determine, if possible, the involvement of the main artery; on the eighth day there was considerable swelling of the thigh, marked pulsation, with the characteristic thrill of arterio-venous communication, which had developed within the preceding forty-eight hours. The bruit was quite distinct throughout the limb, and loud over the cardiac region.

It was now evident that the knife in its upward course had passed into the artery and vein; that these vessels having been wounded in a vertical direction, the tendency after a copious draining was to close up; the blood was therefore sent down the limb at first, and not until reaction with softening and suppuration had supervened did the wound open, and by the loss of its transient adhesions give way to an escape of arterial blood into the accompanying vein and adjacent cellular tissue.

August 15th. Ligation of the femoral artery at the apex of Scarpa's triangle was first effected, and without any trouble, the point of ligation being about half an inch above the original wound made by the knife. The incision was

then prolonged until the wound of the artery was reached; this was signalized by a fierce gush of blood, which was arrested by pressure below; the femoral was, after a little dissection, again ligated; considerable hemorrhage continuing from the femoral vein, which was divided for some distance, it was thought best, since pressure would not control it, to pass a ligature under this vessel also. This having arrested all further bleeding, the margins of the wound were brought together with leaden sutures—quite an amount of coagula being previously removed from the site of the wounded vessels. One disc of cup-shaped laminated clot, three-fourths of an inch in diameter, laid immediately over the wound in the artery and vein, and for a time, probably, acted as a barrier to the escape of blood into the tissues.

Artificial heat was applied to the limb during the succeeding forty-eight hours, when, becoming uncomfortable, it was removed. The femoral ligature separated on the seventh day; the others were all away by the thirteenth; the wound, which was quite large, closed up slowly; and the patient, who never had a bad symptom following the operation, was discharged, cured, October 1st, 1867, fifty-three days after the accident. The circulation in the limb was well established, the anterior and posterior tibials pulsating normally.

Case XVII.—1867. *Aneurism of the Gluteal Region; Successful Ligation of the Left Internal Iliac Artery.* By Thomas G. Morton, M.D.

John Miles, aged 24, from Harrisburg, Pa., was admitted September 28th, 1867, with a tumor involving the left buttock. The patient was rather spare, being in weight about 135 lbs., in height 5 feet 7½ inches, and of a nervo-sanguine temperament.

He had enlisted in August, 1861, in Co. K, 45th Pennsylvania Volunteers, and on the 13th of December, 1863, was taken prisoner at Clinch Mountain, Tenn., transported to Richmond, Va., and thence transferred to Belle Island, where he remained until March 8th, 1864. He was then conveyed

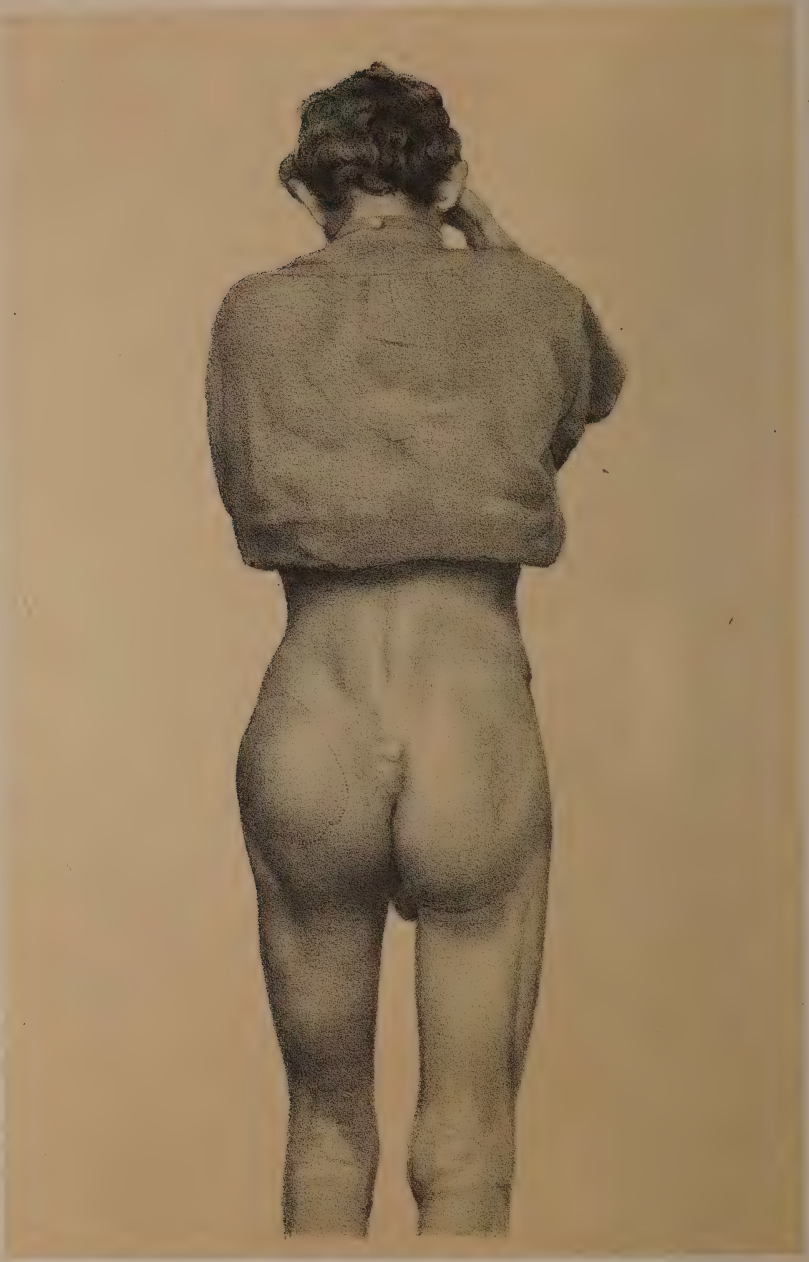
to Andersonville prison, where he was confined until March 18th, 1865. He was then exchanged, at Big Black River, near Vicksburg, rejoining his regiment soon after, and, his term having expired, was honorably discharged.

In September, 1866, he fell and sustained a fracture of the left clavicle, about the middle. From the 22d of May, 1867, until the 17th of July, he was engaged in the service of the Pennsylvania Railroad Company, and on the last-named day, when running alongside of the track, he trod on a round stone, fell, and struck his left hip, which had been painful from rheumatism, as he thought, since the month of May. After this he was obliged to give up his situation, and has ever since had steadily-increasing pain, and been obliged to walk with a cane. In June a swelling appeared on the dorsum of the ilium, and lameness and pain became prominent symptoms.

A gradual increase in the tumor was observed; the pain, which was neuralgic in character, followed closely the course of the sciatic and obturator nerves, and was particularly severe around the knee and inner maleolus, obliging the patient to have recourse to large doses of morphia.

The disease at the time of his admission had the appearance of a large deep abscess, but distinct pulsation and bruit were detected, the former being quite expansive, the latter could be heard all over the tumor. Pressure diminished very much the bulk of the tumor, which rapidly filled up with the circulation unobstructed. The tumor measured five and a half inches transversely and six and a half in the vertical diameter; comparative measurement of the two sides of the body showed on the tumor side from the median line in front to spine a distance of eighteen inches, and on the sound side sixteen and three-quarters. A careful examination per rectum gave no evidence of any intra-pelvic tumor, although the bruit was communicated through the abdominal parietes.

October 14th. Within the last week the pain has been much more intense throughout the entire limb, the tumor has increased considerably since first observed, and the



pulsations much more strong and superficial, especially on the upper and posterior portion adjacent to the sacrum. Intense pain and soreness are experienced from the examinations, especially about the region of the sciatic notch. The distress in walking is increasing, and lameness very decided.

The tumor now measures twenty-six inches around the pulsating base, ten in its transverse, and seven inches in the vertical diameter. (See Plate B.)

Morphia injected subcutaneously along the course of the sciatic produced but little relief, one grain internally giving but little sleep.

This case, although a very unusual one in the youth of the patient as a subject of arterial disease and its spontaneous origin, corresponded in other respects so nearly in character with that described by Mr. Syme, that I believed it to be a similar one, and not a cancerous affection, the possibility of which was fully discussed.

The one referred to was reported by Mr. Syme in 1861:* "The patient, a young man, aged 22, was admitted into the Hospital in May of the same year, in the hope of obtaining relief from a tumor in his left buttock. It was round and tense, lying on the sciatic notch, and presenting the aspect of a chronic abscess; but being found to have a strong expansive pulsation when the hand was placed over its surface. The swelling was greatly reduced in bulk by pressure, but speedily regained it when freed from restraint with a still more forcible distending throb, and as the aneurismal bruit was also very strongly pronounced, there could not be any doubt entertained in regard to the nature of the disease. The patient stated that he had only lately become aware of the disease, having his attention directed to it by pains in his hip and weakness of the limb. On the 29th of May the internal iliac was tied, and the patient was discharged, cured, July 29th, quite well in general health."

After several consultations it was decided not to risk any

* Observ. Clinical Surgery, p. 165. Edinburgh, 1861.

operative measures directly upon the tumor, but to ligate the internal iliac, as it seemed impossible to decide whether the artery just as it escaped from the pelvis was involved, and whether the disease was confined to one or both vessels of the buttock.

16th. The patient being brought under the influence of ether, and having previously sounded the tumor with a grooved needle, I made the ordinary incisions for ligation of the common iliac, viz., a curvilinear incision, about six inches in length, commencing an inch and a half above and to the inner side of the anterior superior spinous process, and terminating about the middle of Poupart's ligament; muscle after muscle was divided on the director; the common iliac was readily reached; and on tracing down this artery the internal branch was found of large size, at least one and a half inches in length. The aneurismal needle was passed without any difficulty from within outwards. The vessel being then tied, the pulsation in the tumor was immediately checked. There was no intra-pelvic disease, the artery being quite healthy as far as it could be traced. The wound was brought together with leaden sutures and adhesive strips, and dressed with a bandage, no vessel having been divided. A two-grain opium suppository was then introduced, and the patient put to bed.

16th, 3 P.M. Constant nausea since the operation, with some abdominal pain. 8 P.M. Vomiting very distressing; ice in small quantities gives some relief; half grain of sulphate of morphia to be taken every three hours.

17th, 9 A.M. Quite cheerful; soft tongue, abdomen swollen, pain general, nausea constant.

Ordered: Calomel and morphia of each gr. $\frac{1}{16}$ every half hour. Brandy and beef-tea as a diet, and an opium plaster to the abdomen.

7 P.M. Pulse more full, but still continues to vomit; no increase of the tympanites.

Ordered: Three grains of aqueous extract of opium by rectum.

18th, A.M. Slept several hours during the night; less nausea;

had a passage from the bowels; urine passes without pain; tongue moist. P.M. Is more comfortable, and has asked for some oyster soup; abdomen tense, without additional pain.

Ordered: Champagne, also to take the opium by rectum.

19th, A.M. Pulse 104; less abdominal pain and tension. The calomel was discontinued. Evening. He has had no vomiting since the morning, having constantly taken small pieces of ice; he has had two alvine evacuations, which have given great relief, his abdomen having become quite soft. The wound is discharging yellowish sanious pus at its lowest part. Again ordered three grains of aqueous extract of opium by rectum at 10 P.M.; the brandy, champagne, &c., to be continued as much as desired.

20th, Sunday. Pulse 104, tongue good and moist; he has not vomited since yesterday morning, and is free from pain; takes a good deal of nourishment besides stimulants.

Quite an amount of sanious pus and broken-down small clots of blood came away with this morning's dressing; charpie was applied, and the stomach was covered with a towel saturated with pure hot laudanum.

21st. Slept all night; had a copious evacuation yesterday, with considerable pain during its passage; pulse 96; skin and tongue good; discharge more purulent, and edges of the wound more healthy; abdomen less tense and free from pain on the right side; no vomiting; very cheerful and comfortable.

22d. Doing well; tongue moist; eating broiled oysters; able to move himself about in bed, and has had no pain about the gluteal region or limb since the operation; tumor hard and very much less in size. The wound is discharging freely, clots of very dark blood being sponged away. The margins of the wound were approximated with adhesive plaster, and charpie was placed over it. The hot laudanum cloths were applied on the stomach as before.

24th. Had one vomiting attack yesterday morning after the dressing, which seemed to be reflex in character, the discharge from the stomach not being accompanied by any nausea, and appearing to be roused by the irritation of the

dressing, a movement of the bowels occurring at the same time. The wound yesterday discharged some broken-down clots and shreds of sloughy cellular tissue. The discharge to-day is more purulent. Pulse 96, and tongue good.

25th. Patient slept well last night, after taking a half grain of sulphate of morphia. His bowels are open each day, and are less flatulent. The wound is discharging freely of laudable pus without clots.

28th. Wound granulating up very well; the discharge is good in color and quantity; the lips of the wound are well approximated. Pulse 88, tongue soft. The tumor is contracted and free from all pulsation.

30th. During the last forty-eight hours there has been considerable pain around the great trochanter, of a dull, aching nature. There is a decided pulsation in the tumor, especially on the sacral portion. The main body of the tumor is hard, with hardly a perceptible movement. This is the first occasion, although the tumor has been examined frequently, that I have been able to detect the return of blood. I should judge, moreover, that the occurrence of pain two days ago, the first perceived since the operation two weeks since, was due to some slight increase of the tumor, and renewed the pressure on the nerve. The wound of operation is rapidly filling up, and the discharge growing less each day, being of good color and consistence.

31st. Considerable pain during the night, extending as far as the ankle; pulsation not so marked, and pain less.

Ordered: Ice in a bag to be applied to the tumor.

November 2d. Doing well; some difficulty in urinating, with pain in the glans penis. To avoid any straining, the catheter was used twice a day. The pulsation in the tumor at times seems entirely absent, but to-day a very slight movement could be detected on the upper and sacral portions.

4th. Tumor less in size, and pulsation hardly distinguishable; trifling pain when passing water; tongue, skin, and pulse good.

7th. Ligature came away this morning, after an interval

of twenty-two full days. He slept well last night; general condition good.

13th. Tumor diminished in size, and is without pulsation. The wound of operation is rapidly closing; considerable pain about the hip and knee, which may be ascribed to the consolidation of the tumor. Patient was up and dressed for a short time.

18th. No pulsation; pain at times considerable.

December 9th. The wound of operation has closed up firmly; the tumor has diminished within the past few days, but is quite soft, and may eventually suppurate. An exploring needle gave vent to serum from one point and pus (observed under the microscope) from the other; the latter was found deeply situated. A flaxseed poultice has proved a very soothing dressing.

December 14th. The patient was discharged December 11th at his own request, and returned to his home in Harrisburg.

So far as the ligation of the artery is concerned, the operation has been successful, the ligature having separated on the twenty-second day, and the wound having cicatrized by the seventh week. The future alone will determine whether the patient will be able to endure the drain of suppuration, should this complication arise.

Note.—As previously stated, from 1852 to 1864, no operation upon any large vessel was performed; yet during this period, three quite interesting cases of aneurism (worthy of record) were admitted: two of these were popliteal, the third involved the right subclavian. The notes of the former were furnished to me by Dr. G. W. Norris.

The first case was a man from the country, aged twenty-nine, admitted November 21st, 1853, for hemorrhage from popliteal aneurism. The disease had been mistaken for abscess, and punctured. On the day of his admission he had lost a very large amount of blood. December 1st the thigh was amputated, and on the 11th, the patient died.

The second case was Hugh Gormley, aged thirty-six, ad-

mitted for popliteal aneurism September 7th, 1856. It was very large, and the sac gangrenous. He had twice been recommended to have the artery tied, and refused. His thigh was amputated on the 10th of September. Died October 25th, from pyæmia.

The third was a case of subclavian aneurism, the notes of which were taken by myself at the time, while Resident Surgeon. John Cusack, aged thirty-nine, was admitted July 31st, 1857, by Dr. Pancoast. Six months previously the patient observed a swelling in the root of his neck, just above the clavicle, upon the right side, which he attributed to lifting heavy weights; pain in the arm and shoulder soon came on. When admitted, an aneurismal tumor with marked impulse and bruit was found occupying the lower part of the neck, which measured five inches in length, and extended as low as the third rib, and from the border of the axilla to the clavicular attachment of the sterno-cleido mastoid. The shoulder was much elevated from the encroachment of the tumor. The radial pulse was extremely feeble. Several consultations of the surgeons were called, but no operation was deemed advisable unless the tumor should certainly be on the increase.

August 3d. Considerable blood was taken from the arm, and squills and digitalis were ordered, with five drops of the strong tincture of aconite, three times a day.

7th. Tumor considerably larger, with intense pain in the arm. Dr. Pancoast decided to tie the subclavian.

8th. Patient very weak; had an attack of syncope about 7 A.M.; pulse 44, general coldness, profuse perspiration, and nausea. On being brought to the clinical room, the patient fainted. The operation was postponed. P.M. It was found that the patient himself had taken thirty drops of the strongest tincture of aconite by mistake for digitalis, which readily accounted for the sudden prostration of the morning.

10th. Pulse 66; more comfortable.

September 17th. Tumor diminished, and less pain.

23d. Discharged relieved, at his own request.

*Subsequent History.*—All trace of this patient was lost until 1865, when I learned from one of the army surgeons, that Cusack had died in hospital from internal aneurism. He gave an account of the expected operation at the Pennsylvania Hospital, and stated that after his discharge the tumor had steadily decreased. Regaining his health, he enlisted in 1861, as a soldier. After death, the original disease was found to have been aneurism of the subclavian; what remained of the tumor was small and firm.

In this case the patient recovered from a very formidable disease, which threatened at the time to prove fatal. The overdose of aconite, probably, had a very marked influence, through its sedative action, in starting the formation of laminated clot.

TABLE OF LIGATIONS OF LARGE ARTERIES PERFORMED AT THE PENNSYLVANIA HOSPITAL.

| No. | Operator. | Date. | Sex. | Age. | Side. | Artery Ligated. | Disease or Injury. | Result. | Cause of Death. | Ligature Separated. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Randolph, | 1836 | M. | 59 | Right, | Common carotid, . | Varicose aneurism, . . | Died, | Congestion of brain day after operation. | |
| 2 | Norris, | 1838 | M. | 32 | Left, | Femoral, . . . | Pulsating tumor of tibia, | Cured, | . . . . . | 17th day. |
| 3 | Peace, | 1841 | M. | 38 | Right, | External iliac, . | Inguinal aneurism, . . | Cured, | . . . . . | 30th day. |
| 4 | Peace, | 1842 | M. | 36 | Right, | Common iliac, . . | Inguinal aneurism, . . | Cured, | . . . . . | 35th day. |
| 5 | Peace, | 1844 | M. | 46 | Right, | Common carotid, . | Hemorrhage after wound, | Died, | On 31st day, from hemorrhage, | 12th day. |
| 6 | Norris, | 1845 | M. | 35 | Left, | Femoral, . . . | Popliteal aneurism, . . | Cured, | . . . . . | 26th day. |
| 7 | Fox, | 1848 | M. | 24 | Right, | External iliac, . | Inguinal aneurism, . . | Cured, | . . . . . | 17th day. |
| 8 | Fox, | 1848 | M. | 49 | Right, | Common carotid, . | Carotid aneurism, . . . | Cured, | . . . . . | 20th day. |
| 9 | Norris, | 1852 | M. | 42 | Right, | Femoral, . . . | Popliteal aneurism, . . | Cured, | . . . . . | 21st day. |
| 10 | Morton, | 1864 | F. | 36 | Right, | Common carotid, . | Orbital aneurism, . . . | Cured, | . . . . . | 17th day. |
| 11 | Morton, | 1865 | M. | 26 | Right, | Femoral, . . . | Femoral aneurism, . . | Cured, | . . . . . | 16th day. |
| 12 | Morton, | 1866 | M. | 51 | Left, | Subclavian, 2d pt., | Axillary aneurism, . . | Cured, | . . . . . | 18th day. |
| 13 | Hewson, | 1866 | M. | 42 | Left, | Femoral, . . . | Femoral aneurism, . . | Cured, | . . . . . | 21st day. |
| 14 | Hewson, | 1867 | M. | 51 | Right, | Common carotid, . | Innominate aneurism, . | Died, | On 12th day, from serous effusion in lungs. | |
| 15 | Morton, | 1867 | M. | 57 | Right, | External iliac, . | Aneurism of the profunda and femoral, | Died, | On 3d day, from peritonitis. | |
| 16 | Morton, | 1867 | M. | 21 | Right, | Femoral, . . . | Arterio-venous aneurism, | Cured, | . . . . . | 8th day. |
| 17 | Morton, | 1867 | M. | 24 | Left, | Internal iliac, . . | Aneurism of gluteal region, | Wound of operation well; patient returned home, with a non-pulsating tumor. | | 22d day. |

PHILADELPHIA, December, 1867.

# A CASE

OF

# ANEURISM OF THE ARTERIA INNOMINATA,

## ILLUSTRATING SOME POINTS IN PHYSIOLOGY AND THE PRINCIPLE OF MR. WARDROP'S OPERATION.

By ADDINELL HEWSON, M.D.,

ONE OF THE SURGEONS TO THE PENNSYLVANIA HOSPITAL.

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The following case of aneurism recently under my care in the Hospital, presented so many points of interest both in physiology and pathology, as to make it, I believe, worthy the attention of the readers of these Reports. Its history, and the daily records of its progress from which this account is drawn, were carefully noted by my efficient clinical clerk, Mr. Charles Hunter, and the value and accuracy of some special portions are particularly due to the assistance rendered me in their development by Dr. Da Costa, my colleague of the medical wards.

*History.*—John Granfield, a seaman, aged 51 years, was admitted on the 11th of March, 1867, and gave the following detailed history of his case. He had been following the sea as common seaman for twenty-five years, but had not, in his own estimation, been much exposed or severely taxed during the last five years. He had enjoyed uninterruptedly good health up to 1848, when he was attacked with typhus fever; from this he recovered without any ill consequences,

and remained free from any indisposition whatever until 1852 when he had a mild attack of rheumatism, the first he had ever had of the disease. It was confined to the lower limbs, and he speedily recovered from it. From that time up to the beginning of 1866 he was perfectly well. He was then seized with a severe aching in the right ear. This pain was much aggravated by exposure to the cold. A week later there was superadded a severe pain in the right shoulder, which extended down to the elbow. For these pains he used antirheumatic remedies under advice, but without obtaining any relief. After they had continued about four months, he perceived, for the first time, a pulsation in the right side of the neck. This became more and more perceptible, and ten days later he began to notice a swelling immediately behind the right sterno-clavicular articulation. This swelling increased very slowly, and did not incommode him in any way for fully three months after it was first detected. Then it seemed to provoke fits of coughing at every deep inspiration. These symptoms became more and more distinct, until about one month before his admission into our Hospital, when he experienced a deep-seated pain in the right eye and noticed that the sight was failing. His voice then became husky and indistinct, and he experienced some difficulty in swallowing solid food in any bulk. These symptoms all coming on suddenly after a walk of some miles, he attributed their occurrence to that circumstance. Shortly after this, he noticed that pressure on the tumor, which had then increased to a considerable size, would incite a sharp stinging pain, as he described it, in the right eyeball independent of that from the ear. Then, at a later period, he experienced a similar pain in the right ear produced by pressure on the point where the facial vessels cross over the base of the lower jaw, and if he continued this pressure any time this pain would seem to shoot forward toward the right eye. Another long walk aggravated all these symptoms, so that when he was admitted into our Hospital ten days later, he was suffering with great dyspnœa and almost complete aphonia. He could not swallow any solid food. It stopped,

as he expressed the fact, in his throat, and obliged him to take some liquid to wash it down. He then experienced a sensation of great heat in the right eye, side of the face, and shoulder. He could not recline on either side, but had to lie on his back or belly to be comfortable. His rest was very much disturbed by bad dreams. He had then on frequent occasions sharp stinging pains in the region of the right nipple, sometimes in the tumor itself, and even in the left side, but never in the breast bone. He had a constant expression of anxiety in his face. His diathesis was markedly arthritic, but there was an absence of arcus senilis. His pulse was 92. Respiration 18. Temperature (in both axillæ the same) $98\frac{1}{2}°$. There was a murmur with the first sound of the heart, or rather just preceding it, and the second sound was less distinct than natural. The tumor measured three inches and a half (full measure) from side to side immediately above the clavicle. Its thrill was distinctly perceptible all over its surface and along the carotid.

A difference, scarcely, if at all, perceptible by the touch, between the pulses of either wrist, was well defined by the sphygmograph even after the patient had been quietly resting on his bed for a week in the Hospital. A similar difference was demonstrated, and in the same way, between the temporals of either side. These tracings by the sphygmograph will be found at the close of this article, where their consideration can be made more intelligible by the contrast which can then be drawn between them and those obtained at other periods in the progress of the case.

Careful examinations did not reveal to us any other lesions, and as the patient was not only willing but anxious to undergo any operation to obtain relief, it was determined, after consultation with my colleagues Drs. Hunt, Morton, and Agnew, of the surgical staff, to perform Wardrop's operation by tying the right primitive carotid immediately above the tumor. This was accordingly done on the 20th of March. Three hours prior to its performance, the patient's pulse was noted as 104. His temperature in both axillæ $98\frac{3}{4}°$. Respirations 20 per minute.

Local anæsthesia alone was employed in the operation, and no difficulty or untoward circumstance occurred, save the necessity of putting a ligature around the internal jugular, in order to draw it sufficiently out of the way to allow of the carotid being secured as closely as we desired to its origin. The traction on the vein (in this way) made it seem advisable for us to tie the ligature tight around it before closing the wound. There was no perceptible effect on the tumor produced immediately by the operation; but I noticed, shortly after the patient was placed in his bed, that the contraction of the right pupil had been replaced by a most positive dilatation, and the patient declared that his sight was much better. He also informed me that he no longer had the pains in his eye, ear, or side of his neck, although that in his shoulder was still present. Unfortunately it was not convenient to make any sphygmographic observations at the time in the case; and in the evening, about 7 o'clock (seven hours after the operation), the patient was seized suddenly with greatly increased dyspnœa. His face became livid, especially on the right side. This, he thought, was due to the tightness of the bandage around his neck. On loosening this it was found that the tumor was evidently much larger and firmer than it had been prior to the operation, and its thrill much less perceptible. Auscultation revealed abundant loose mucous rales throughout the chest, but especially in the right lung. Soon after loosening this bandage the patient fell asleep and slept soundly through the greater part of the night. Two drachms of the solution of morphia had been administered to him some time before this attack of dyspnœa manifested itself, but none afterwards. On the following morning he expressed himself as very comfortable, and said he had had a good night's rest. His pulse was 100. Temperature in left axilla 100°; in his right 99½°; in left temple 98°; in right 97°. The observations in the temples were made by placing the bulb of the thermometer on the temple and binding it there by a wad of oakum and a bandage. No pulsation could be detected in the right temporal artery. Pupil of right eye still dilated. No return of

pain or sensations of heat in right side of face and neck. Difficulties of deglutition, respiration, and vocalization still present. Rales not so marked in the lungs; has been expectorating freely a loose, frothy mucus.

Sphygmography showed not only an increase of impulse and force in left side, but a positive disposition in the right radial pulse to assume a more normal form (see p. 239). These observations were made 20½ hours after the operation.

On the morning of the second day his temperature was 99½° in both axillæ, 99° in left temple, and 98° in right temple. Pulse 120; respiration 19. Said he did not sleep well, although he had had the solution of morphia the night before. No other change was noted.

On the morning of the third day, pulse 108. Temperature in right axilla 98°; in left 98½°; in right temple 96¾°. Same in left. Slept more comfortably last night. Rales in chest not so marked or so abundant. Deglutition and dyspnœa better. Had a slight spell of difficult breathing last night.

On the fourth day, pulse 100. Temperature in right axilla 98¼°; in left 98½°. 96¼° in right temple, and 97° in left; respiration 13. Pulsations in tumor less perceptible. Tumor much firmer and decidedly less in size. It measures only 2 inches in its semi-circumference at the point where it measured 3½ inches before the operation. His breathing, voice, and deglutition all decidedly better. Made a meal off of broiled chicken and bread and butter, and experienced no difficulty in swallowing them. No movement of bowels since operation. Ordered two simple rhubarb pills. Removed stitches from wound.

On the fifth morning, pulse 100. Temperature in right axilla 98°; in left 98¼°. No difference noted in the temples. No action from the pills. Wound looking well. Deglutition and respiration still improving. Cough less troublesome. Expectoration less abundant. No difficulty in swallowing his dinner yesterday, which was made off of boiled mutton, potatoes, and bread. Ordered sal seidlitz.

On the sixth morning, pulse 100. Temperature in right axilla 98°; in left 98¼°; in right temple 96¼°; in left 96¾°.

Detected this morning, for the first time, pulsations in right temporal artery. Pupil still dilated. Slept well last night. Had a free movement from the bowels. Rales much less, but voice not so clear. Thinks he exerted himself too much talking to his friends last evening. About 1 P.M. (on this day) a hemorrhage, amounting altogether to an ounce of blood, took place from the wound; it ceased spontaneously without necessitating the removal of the dressings, but recurred in the night; and on examining the wound then it was found to have proceeded from the jugular, from which the ligature had come away.

On the following morning (the seventh from the operation) the patient expressed himself as having rested well notwithstanding the alarm produced by his hemorrhages. His pulse was, however, 104; respiration 16. Temperature in right axilla 98°; left 98¼°. No difference in temples. Tumor still diminishing. No pulsation perceptible. No difficulty in deglutition. Voice growing stronger every day. Appetite improving. Tongue furred.

On the eighth day we observed a slight hernial protrusion to take place on the right side of the junction of the body and manubrium of the sternum, in the intercostal space there, whenever the patient would make a forced expiration. There appeared to be some increase of heat, and some redness at this point. Pulse 96; respiration 15. Temperature in axilla of right side 98¼°; of left 98½°. No difference in the temples.

On the ninth day the protrusion on the right side of the sternum did not seem so marked. Pulse 96. Temperature in right axilla 99¼°; in left 99½°; respiration 16. Voice still clearer. Says he is doing very well. Good appetite. No difficulty now in deglutition. Pupil still dilated.

On the tenth day he was very comfortable in the morning; had had his bowels freely moved by sal seidlitz, taken before breakfast. Pulse 100; respirations 16; temperature in both sides the same, 98¼°. In the afternoon he expressed himself as feeling very weak; his face then grew livid, bedewed with moisture; his respirations became very labored, and he lost his voice almost entirely. The tumor was then

found very much distended, and was evidently producing the difficulty. The symptoms of asphyxia steadily increased through the night. The temperature noted at 4 A.M. of the eleventh day was, in the right side, 101½° and in the left 100¾°; and a half hour before death, which occurred at 10½ A.M. of that day, it was 97½° in right side and 97° in the left. The mode of death was evidently that of asphyxia.

The autopsy was made that afternoon. The wound in the neck was found to have almost entirely cicatrized. The ligature had cut its way through the carotid, and was merely detained by a shred of cellular tissue. The cervical sympathetic lying under this point was perfectly healthy. On removing the sternum and part of the right clavicle, in order to expose the tumor *in situ*, it was discovered that it was not only adherent to them, but had absolutely eroded their bony structure at the sterno-clavicular articulation. When thoroughly exposed, the tumor was found to have involved, besides the whole of the innominate artery, a portion of the upper wall of the arch of the aorta. It was pyriform in shape, and looked like an outgrowth from the arch, the broader end resting in that structure. Just above the arch, where the tumor was the largest, it measured six inches in semi-circumference, and extending across the trachea. The mass seemed to have filled up most completely the upper opening of the thoracic walls. The pneumogastrics on both sides were found to have been very severely pressed upon by the tumor. The same was the case with the recurrent laryngeals. This compression had evidently been more severe on the right side in both of these nerves. The upper end of the tumor did not project much over an inch above the clavicle and sternum, and lay well over on the right side of the trachea; here its semi-circumference was about two inches, and it could readily be seen that it must have pressed when it was larger, on the inner portion of the spinal accessory. The cavity of the aneurism, when laid open, was found filled with coagula—a portion of which were very firm, partly decolorized, and tightly adherent to the wall; and another, the central portion, in area about equal to the

normal innominate artery, was of dark, grumous blood, and followed a curved line from the arch of the aorta over to the right subclavian. The aortic orifice of the tumor was found, by actual measurement, to be $5\frac{1}{4}$ inches in circumference, with well-defined margin, covered with a perfect lining membrane, so that by its growth it had come to involve that much of the arch. The aorta itself was dilated behind this point, and studded with patches of atheroma. The orifice of the left carotid was much contracted, and its calibre had evidently been diminished by the pressure of the tumor.

The heart was of normal size; its left ventricle somewhat dilated; its mitral valves roughened by deposit.

Both lungs were stuffed with frothy serum. They were discolored by carbon, and in points quite solidified.

All the other organs were healthy. No examination was made of the brain.

Remarks.—Before discussing the points of the case bearing on the merits of Wardrop's operation, I shall make some observations on the various phenomena developed in the early history and subsequent course of the case. These phenomena certainly possess an intrinsic value to the physiologist; and this value is enhanced by the fact that their occurrence was not anticipated and proved by categorical questioning, but was stated voluntarily by the patient, without knowing of their import; and indeed there was not only no notion or theory in my mind as to the meaning of some of them at the time they were recorded, but their full significance was not suggested until I came to reflect over the history of the case after its completion. The latter circumstance must be my apology for many defects in their details.

In reflecting over these, one's attention is naturally arrested by what the patient himself esteemed as the first indication of the development of his aneurism, namely, the pain in the right ear. The presence of this might readily be thought to be a mere coincidence, in no way due to the aneurism, but it persisted so positively up to the time of the ligation of the artery, and then so suddenly disappeared, that there seems to have been some real relation, as cause and effect, between

the aneurism and it; and a relation, too, which did not exist through mere reflex action, for this pain was removed by the operation and never reappeared, as it should have done if from such action in the nervous system when the tumor became solid and pressed more firmly than ever on the parts which could transmit such action.

Now the only medium between the two points which could have been severed by the operation, was that through the filaments of the sympathetic running along the primitive and internal carotid arteries to form the carotid plexus from which branches go to the otic ganglion, there to be blended with those from the fifth nerve which furnish the deeper parts (like the auditory meatus) of the ear, with their extreme sensitiveness.

This medium would also appear to be the one through which the eye was so seriously affected by the aneurism; for it will be remembered, that not only before the operation, but at a period antecedent to that in which he first noticed, that by pressing on the tumor he could excite a pain in the eyeball independent of any sensation about the ear, and before he became conscious of the fact, that by pressing over the submaxillary ganglion he could produce pain in front of the ear, which by increasing the pressure he could make extend forward to the eye—prior to all these, he became conscious of dimness of vision in the right eye. Now as far as my opportunities allowed me to judge, this dimness appeared to arise simply from contraction of pupil—an opinion confirmed by the facts observed immediately after the operation, for then it will be remembered the pupil was observed to be much more dilated than its fellow, and the patient declared that his vision had greatly improved. It is to be regretted that no ophthalmoscopic examinations were made in the case, both before and after the operation—this is one of the defects, however, which I have before taken occasion to lament. The other phenomena manifested about the eye, can be explained in other ways. The pain deep in the eye produced by firm pressure on the tumor, might have been through direct influence on the cervical sympathetic trans-

mitted to the fifth nerve or through reflex action; it was in no ways disturbed by the operation. That produced by pressure on the submaxillary ganglion might have been through hyperæsthesia of the filaments of the fifth, which go into this ganglion, with a branch of the seventh, and are distributed with other branches of the last-named nerve to the temple, eyelids, &c., or it might have been through the filaments of the sympathetic which accompany the superficialis colli branch of the cervical plexus, for this pain, or rather the power to produce it, was immediately destroyed by the operation, a result, which it might have accomplished either in the first manner, by severing the carotid filaments of the sympathetic, and allaying thereby the irritation in the fifth pair, or in the second, by severing the above-named branch of the cervical plexus, which laid directly across the line of the incision made to reach the artery. The sensation of heat in the eye, side of the face, and front of the neck, were as promptly destroyed, as this power to produce the pain in front of the ear and side of the face, or as the dimness of vision and contracted pupil.

Of all the phenomena which were so singularly affected by the operation, those concerning the pupil of the eye are the most curious and probably the most important, and if the theory which has seemed to me the most probable of their mode of production is the correct one, we have in them support for the idea that the movements of the pupil are dependent upon the vascularity of the iris. This matter has been the subject of frequent discussion ever since the days of Albert Von Haller, and is still unsettled. There are some points concerning it which are inexplicable with our present knowledge by either the muscular or vascular theories. All the participants in these discussions have, until very recently at least, accepted as facts, not only the results of vivisections showing that division of the cervical sympathetic was followed by contraction of the pupil, and that of the oculo-motor (the third cerebral) nerve by dilatation, but the interpretations put upon these results, namely, that there is a direct antagonism between these two sets of nerves of so positive a char-

acter, that by the paralysis of one, its opponent gains full sway, and dilatation or contraction is the consequence, as the case may be, and the corollary to this, that these nerves are the only medium of communicating such movements to the iris. Starting on these premises, the advocates of the muscular power in the iris have the advantage in reference to dilatation, in the well-established fact that the third nerve is one of motor power distributed to the muscular structure, and to account for the contraction produced by division of the sympathetic, they have to assign to it a direct power of controlling muscular action, which it does not appear to have in any other part of the body, and which is inconsistent with its known character elsewhere. These very facts are urged by the opponents of this theory in favor of the vascular theory, and in this they have the advantage; but their stumbling-block is in the effects of division of the third nerve, and they seem to have no way of getting over them, as they have accepted as a fact the inference drawn from such effects, that the contracting power in the pupil was derived through the third nerve only. Now, there is scarcely any one who has had experience in ophthalmic surgery, who cannot recall instances of ptosis with rotation of the ball indicating paralysis of the oculo-motor nerve, in which there were no signs whatever of want of contractile power in the pupil of the eye. Then a careful study of Bernard's experiments will satisfy any one that the movements of the pupil are not paralyzed by the sections of either the third or the cervical sympathetic. As, for instance, he shows that after division of the third, although there is dilatation of the pupil, the pupil can be made to contract by irritants applied to the conjunctiva, and to dilate still more by mydriatics applied to the same surface, and on pinching the fifth pair contractions can be provoked in the pupil whether the third nerve is divided or not. Then by galvanizing the third nerve in front of the ophthalmic ganglion no contractions can be produced, but if the current is passed through the ciliary filaments which go from that ganglion to the eyeball they can be. All these circumstances seem to me to lead fairly

to the conclusion, that the motions of the pupil as to contraction are really under the control of the sympathetic, and the part performed in such movements by the third is merely that of a carrier of mandates to the ophthalmic ganglion from the brain in accordance with impressions made through the *retina* or otherwise. In confirmation of the latter conclusion, I need but refer to some other of Bernard's experiments, where the optic nerve having been previously divided, no further dilatation occurred by subsequent division of the third; and to cases which we meet in practice of dilatation (without real paralysis of the pupil) that occur where the optic nerve is rendered insensible by disease; and to the fact that such a theory of the action of the third is in strict accord with its character as a motor or efferent nerve. When, in addition, we find such authorities as Arnold, Robin, and Hyrtl, denying (after careful search) the existence of any muscular structure in the iris other than that which belongs to erectile tissue, the weight of testimony seems to bear irresistibly against this portion of the premise on which both parties have agreed. Nor can I find, in the fact that division of the cervical sympathetic is uniformly followed by contractions of the pupil, any better proof for the other portion of the same premise, namely, that that part of the sympathetic is the only medium of communicating the dilating action in the pupil. For Bernard's experiments also prove that there is no more complete paralysis in such cases than there is for the contracting power when the third has been severed near its origin, for after the division of this portion of the sympathetic we can still excite dilatation by mydriatics applied to the conjunctiva, a circumstance which certainly could not have taken place if the medium of communication was only through motor filaments running up the neck in the cervical sympathetic, from what Waller and Budge have designated the *cilio-spinal axis*. Indeed, such impressions from belladonna, &c., applied in that way, are clearly through the trifacial, and its connections with the sympathetic show that the origin of such motor power in the iris must be higher. Therefore, as the only

known mode of communication between the cervical sympathetic and the ciliary nerves is through the ophthalmic ganglion by the carotid plexus, and, as this is the point at which both the third and fifth nerves apparently make their communications with the ciliary, is it at all illogical to conclude that the motor action of the pupil (either for dilatation or contraction) is developed thus in that ganglion? It is for some skilful experimental physiologist to demonstrate the real power of the ganglion in this matter beyond all cavil or doubt.

The supposition that the contraction of the pupil in this instance was from compression of the cervical sympathetic is not at all tenable, for if such was the case, why did it disappear after the operation and before there was any evidence of diminution in the size of the tumor? And why did it not return when such pressure must have become materially greater by the solidification of the contents of the sac? The dilatation cannot, for the same reason, be supposed to have been from the removal of the pressure. Such removal could not *per se* provoke dilatation. It could not stimulate action beyond its normal point in another and distinct set of nerves, and certainly could not destroy any action. The phenomenon of dilatation can no more be considered as a mere coincidence than that of contraction. It has frequently been noted as an effect of the ligation of the common carotid,* and I have observed it in all the instances of the operation which have come under my notice; but my attention has always been directed to the matter through special interest in ophthalmology; hence, I have a conviction that *it is* of constant occurrence, and it remains to be proven that it is not. The persistence of this phenomenon, after the circulation was fully re-established in the carotids, shows that it was not from the supply of blood being cut off.

Now, it is not difficult to conceive that both of these phenomena in the pupil resulted through effects on the carotid plexus before and after the operation, considering the fact

* See Gross's Surgery.

that that plexus furnishes the only direct means known of communication between the eye and the sympathetic, lower down; but this implies some other medium than that hitherto generally acknowledged—the cervical sympathetic. Such an idea is, however, strictly in accordance with facts demonstrated by Brown-Sequard and Shiff. The first of these eminent authorities has found filaments which can directly influence the iris very much lower down than the point at which Waller and Budge have designated the origin of the ciliary branches, and at which he (Sequard) believes those branches of the sympathetic originate, for he has ascertained the presence of such filaments in the vicinity of the ninth or tenth dorsal vertebra; and Shiff has found some of these fibres ascending along the spinal cord as high as the medulla. The dilatation in this case offers an additional fact, then, against the cervical sympathetic being the only direct medium of communication from the neck to the iris; and the two phenomena (namely, those of contraction and dilatation) having resulted, as far as we can see, from direct disturbance of the vaso-motor branches of the sympathetic, give support to the vascular theory for the movements of the pupil.

The difficulties in respiration, deglutition, and vocalization, were all very definite and characteristic of the pressure of such a large tumor in the locality of this. Those from the pressure on the pneumogastric were particularly instructive. The disturbance in the frequency of the movements of the chest, so constantly noted, was really the only unfavorable sign offered in this case, up to twenty-four hours before the death occurred. But I need not comment on any of these.

I will now pass to the consideration of some of the effects observed in this case in reference specially to the operation. The method of operating adopted was that with which Mr. Wardrop's name has long been associated as its originator, and is familiar to every one at all conversant with operative surgery; but the very summary manner in which it is disposed of in most of our manuals and systematic treatises,

without any consideration or discussion of the principle on which it is founded, readily explains the general ignorance on the subject, and the indifference or even worse treatment shown the operation as a remedial agent. The history of the operation is both curious and instructive as detailed by Mr. Wardrop himself. The points in it are briefly these: Whilst considering the effect of Brasdor's operation of tying the artery on the distal side of an aneurism, and the manner in which nature had effected spontaneous cures in some cases which had come under his notice, Mr. Wardrop was forced into the conviction that it was not necessary (as was then generally supposed) to put a complete stop to the circulation of the blood in the tumor, to secure its coagulation. He was then (as he says) naturally induced to consider the important question, To what extent is it necessary to diminish the momentum of the circulation through an aneurism before the blood contained in it will coagulate (p. 62)? It appeared indisputable to him, in a case of spontaneous cure, "that a process of coagulation in the aneurismal sac must have begun when the momentum of blood in it could have been but very slightly diminished, no more alteration having taken place in the circulation than what might be supposed to be the effect of an enlargement of the calibre of the arterial tube at the diseased part." Neither can it be supposed that the vessels which were obliterated "could have undergone anything like a sudden or instantaneous obstruction. On the contrary, whatever the process may have been, the arteries seemed to have undergone a gradual obstruction, indicated by the slow diminution in the force of their pulsation."—*Ib.**

Then next considering what became of the blood diverted by the obstruction of one of a number of branches coming off from the artery beyond its aneurismal enlargement, Mr. Wardrop satisfied himself, by an appeal to the laws of hydrostatics, that it is not directed exclusively into those branches beyond the tumor, but is distributed between them and the branches contiguous to the tumor on the cardiac

* Wardrop on Aneurism. London, 1828.

side, and that this distribution takes place in the ratio of the squares of the diameters of such tubes to each other. As, for instance, in a case of aneurism of the arteria innominata, if the primitive carotid of the right side should become obliterated by either a firm coagulum or a ligature, the current which went through it before would not then be all diverted to the subclavian, but some would also be sent into the aorta. Indeed a very much greater quantity would go there than into the subclavian, on account of the aorta being much larger.

The truly philosophical manner in which, as may be seen from this short sketch, Mr. Wardrop discusses the whole subject, and the logical soundness with which he advocates his plan of operating, have always impressed me most favorably with his views, and it has seemed to me that it must be essentially from ignorance of its principle that the operation has not been more generally adopted.

To test this principle as thoroughly as I could in this case, I employed the sphygmograph and thermometer, as I conceived they might both throw some light on the subject.

As the sphygmograph is somewhat of a novelty, the mode of interpreting its tracings is probably not familiar to all the readers of this article. In order, therefore, to make my remarks here perfectly clear, I must premise with some statement of the basis on which these tracings are to be construed. The object Dr. Marey had in view in the construction of his instrument was to obtain a representation on paper of the characteristics of the pulse, and he has demonstrated the principles on which it is to be interpreted. The tracing of each pulsation by this instrument consists of three distinct parts—a line of *ascent*, a *summit*, and a line of *descent*. The line of *ascent* corresponds to the afflux of blood in the arterial system under the influence of the contraction of the left ventricle; and as the apparatus for recording these tracings proceeds always at the same rate, the more rapid the afflux the more vertical will be this line of the tracing, and *vice versa*. Thus this line may be a vertical one, or more or less oblique, and, according to the relative resistance to

this afflux, it may be broken and zigzag or curvilinear. The summit corresponds to the period when the afflux and efflux of the blood in the artery exactly balance each other, and as this period varies in length, so we find this part of the tracing varying. It is sometimes a sharp point, connecting the lines of ascent and of descent; it is sometimes a rounded point, and sometimes a plane of varied length, limited by either sharp or rounded angles. Sometimes this plane is horizontal; sometimes (when the afflux is stronger than the efflux) it is somewhat ascending in its direction; and sometimes (when the efflux is the stronger) it is more or less descending.

The line of descent corresponds to the time between the closing of the aortic valves and the next ventricular contraction, and shows the facility with which the current of the blood flows on through the capillaries.

The direction of this line is more or less oblique, and the amount of its obliquity shows the quickness of the fall of the pressure in the bloodvessels. Its form is sometimes a purely oblique, straight line; sometimes it is curved with the convexity looking upward, and sometimes it has one, two, or more undulations in it. These undulations, which constitute the *dicrotism* in the pulse, result from the weight of the blood and the elasticity of the arteries. Where the tension is greatest this dicrotism will be least marked, and *vice versa*.

The height of a tracing by this instrument is the indication of the *force* of the pulse; but does not, as one would at first suppose, give us any indication of the quantity of blood sent by each ventricular contraction into one part or other of the circulation; for Marey has shown that the height is dependent on the *strength* of the heart's contraction, feeble tension in the vessel subjected to the examination, and slowness of the pulse, or rather great length of the interval between each pulsation. As for instance, in the pulse of the old, the height is unusually great; but in such cases, although there is hypertrophy of the heart, and the current is sent with greater force, the *quantity* is less relatively to the dilated state of the vessels than it is in the young with a healthy

heart, from which we get a tracing of much less altitude. The feeble tension, dependent upon the ready efflux of the current, allows the lever of the instrument to fall more readily, and, consequently, reach a lower point before the next systole begins to produce the line of ascent of another pulsation. Hence it can be seen how the slowness of the pulse can influence the height of the tracing. From these considerations it must be quite evident that we are not to look, in our attempts to judge by the sphygmograph of the quantity of blood sent to either arm after Wardrop's operation, to the relative height of the tracings obtained before and after the operation, but to the more ascending plane of the *summit*, and a less dicrotic character in the line of descent, for these furnish the evidence of increased distension of the bloodvessels.

But besides the characters proper to a single pulse tracing, from which we are to form an opinion in the matter of greater or less distension, there is something in the figure made by the series of such tracings, as they are joined together by Marey's instrument, from which we can get very useful information, for the tracings from a series of pulsations usually form a figure in a horizontal line on the paper, and lines drawn through the summits and bases of the figure are parallel. But any cause which can disturb the pressure of the blood in the arteries will make these lines deviate from the horizontal. As, for instance, if, whilst a tracing is being made, the patient obstructs the ingress and egress of the air to his lungs by allowing it to pass only through one nostril, this line will be depressed in the inspiration and elevated in the expiration; whereas if he make an effort at forced respiration, with mouth and nostrils wide open, the line will be elevated in inspiration and depressed in expiration. In this way we will get four or more pulse tracings (the number depending upon the ratio of the respiration to the pulse) figured in a curved line, instead of a straight horizontal one. These deviations of the line of the whole tracings Dr. Marey demonstrates to be due to variations in the pressure on the aorta, and great vessels in the thorax and abdomen. When

the respiration is carried on by the muscles of the chest only—as when the access of the air is obstructed—the aorta is compressed in expiration, and the blood which it contains is crowded into the arteries of the periphery, and the pressure then is increased,—the line of the figure is therefore made to ascend; whereas in inspiration this pressure is diminished, and the line of the tracings descends.

When the respiration is made full and strong, the diaphragm is driven forcibly down by inspiration, and the abdominal aorta is compressed; the line then ascends, and, on this pressure being removed by expiration, it descends.

In natural, easy respiration, the influence of these two sources of expansion and contraction of the chest about balance each other, as they are about equally brought into play; the line formed by the tracing is then a horizontal one. The amount of distension of the aorta and great vessels can also materially diminish or increase the effect of the disturbing influence of either. As, for instance, if the aorta is very much distended, it will be more compressed, and consequently the line will be more curved, and *vice versa*. This must not, therefore, be overlooked in our consideration of the sphygmographic tracing of this case.

It can be seen, from these facts, that circumstances of an apparently trivial character can exert a material influence in the tracings of the pulse. Beside those already mentioned, I might state the effects of position, distension of abdominal viscera, the time of day, &c. I need not enter into a discussion of their effects, but, to prevent the suspicion of such having had anything to do with the difference to be noticed in the tracings we got in this case, I may mention that all the tracings here presented were taken from the radial arteries at about the same time in the day (8 A.M.), with the patient sitting up in his bed with merely his shirt on, and with his arm resting easily on a table. Each tracing so taken was duplicated to further guard against error.

The first of these tracings were thus made by Dr. Da Costa on the morning of the 19th of March, the day before that on which the operation was performed, and more than a week

after the patient's admission into the ward; so that there were no circumstances, beyond those of the disease, which could influence them.

Fig. 20.

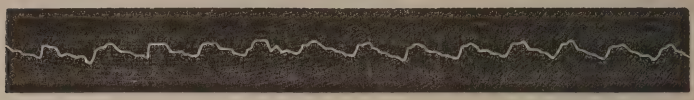
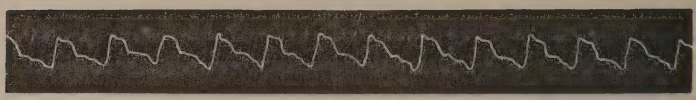


Fig. 21.



The very first glance at these tracings will satisfy the reader that they indicate a decided difference in the *force* of the radial pulses of the two sides; the height of that from the right radial, being really but half that from the left, shows that the force of the contractions in the systemic ventricle were not more than half as much felt in that side. This was owing to these being diffused in the aneurismal cavity, and thus greatly expended before reaching the radial. But this is not all; the easy, oblique, undulating of the line of ascent, the character of the plane constituting the summit, and the gradual and but slightly dicrotic character of the line of descent, show that the blood was passing through the radial in a steady stream. This was clearly the effect of the elasticity of the walls of the aneurism; the sac acting from that circumstance precisely like the bulbous expansion put in the efferent tube of the patent elastic syringes (in common use at the present time) for the purpose of causing the stream from the instrument to be a steady one. In proof of this I may refer to a tracing taken from the carotid just above the tumor, where of course such an effect from the elasticity of the aneurismal sac would be greater (even relatively to the larger size of the vessel) than at the wrist. The lines of ascent in this tracing were more oblique, approached in character and length those of the *descent*, and the height of the whole tracing was very much less than it ought to have been, relatively, from the size of the vessel. The stream was,

therefore, according to our rules of interpretation, both stronger and steadier here than at the radial. The *tension* in the stream was greater than the *elasticity* of artery, and hence the absence of dicrotism. The further removed from the influence of the elasticity of the aneurismal walls, the more power is found in the elasticity of the artery there to resist the steadiness of the stream which the aneurism produces, and hence some show of dicrotism.

In the tracing for the left wrist (Fig. 21), the disposition towards a vertical direction in the line *of ascent*, the short, descending plane of the *summit*, and the marked dicrotism in the *line of descent*, all show but feeble distension in the vessels of that side,—a circumstance easily explained by the immense size and situation of the aortic orifice of the aneurism, which diverted thereby a very large part of each wave of blood as it came from the heart.

The absence of the serpentine character in the *ensemble* of this tracing, a character which we certainly should have expected to find in it, considering the great dyspnœa with which the patient was suffering, is further proof that the quantity of blood sent to this side was not great, that the aorta beyond its ascending portion was not sufficiently distended to indicate any effect from the obstruction to respiration.

The absence of such character in the tracing of the right side can easily be understood by the influence of the aneurismal sac in preventing the transmission of any such effect from the chest.

Figs. 22 and 23, represent the tracings of the pulse at the

Fig. 22.

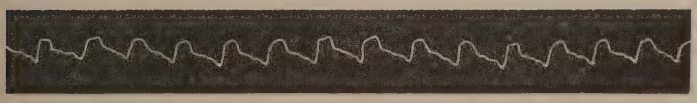
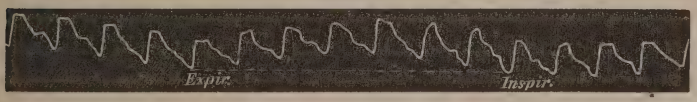


Fig. 23.




two wrists taken about twenty-two hours after the operation was performed, and some fifteen hours after the tumor sud-

denly became larger and firmer, and its thrill and pulsations less distinct.

In that for the right wrist (Fig. 22), we have in the increase of height over that of Fig. 20, a positive sign of a change having taken place in the aneurism of such a character as to diminish, if not destroy, the effect it had had as an elastic sac or chamber, in preventing the transmission of the wave-motion given to the blood by the heart's systole. Such a change was, no doubt, the result of the coagulation of a sufficient quantity of the blood in the sac, to make it a narrower and less elastic channel for the passage of the blood to the subclavian, and substantiates the explanation given of the defective height of the tracing in Fig. 20.

The difference produced by this change was really greater than is to be recognized by a simple contrast of the heights of the two tracings, for there was a difference in the frequency of the pulse, which made a material difference also in favor of the later tracing. The difference of eight beats more per minute of the pulse on this occasion, must have diminished the height of the tracing very considerably over what it would have been under the same strength of systolic contraction where there was less frequency, as was explained in the consideration of the causes of the height of sphygmographic tracings.

As to evidence in this tracing (Fig. 22) of increased quantity of blood going through the right subclavian in consequence of the ligation of the carotid, we have none but in the more ascending direction of the planes of its summit, for the dicrotism of the lines of descent can scarcely be said to be less than it is in those of Fig. 20, and if anything is to be determined by the more vertical direction of its lines of *descent*, it might be, considering the increased frequency of the pulsations, rather against the idea of any such increase; but as such a direction in those lines is an evidence of the quickness in the fall of the pressure in an artery during the heart's diastole, the difference, I think, may be fairly attributed, rather to the removal of the air-chamber effect of the aneu-

rismal sac, than to a decrease in the quantity of blood sent into the subclavian.

It is in Fig. 23, which represents the tracings from the left radial after the operation, that we are to look, according to Mr. Wardrop's view, for the evidence of greatly increased momentum in the force of the circulation.

On examining this tracing critically, it will be found, that there is *actually* no difference between it and Fig. 21, in the heights of a majority of the pulse-traces of each, but its *lines of ascent* are more vertical, *its summits* more pointed, or rather less planiform, and its *lines of descent* have about the same obliquity, but decidedly less dicrotism. Now in these features we have most positive indications of a stronger impulse given to every blood-wave which passed along the aorta beyond the orifice of the innominate than there was before the operation, and that there was a larger quantity of blood driven by each systole in that direction than before.

In the more vertical direction of the *lines of ascent*, we have proof of the greater quickness of the afflux, showing that the momentum in the force of the current, which had almost all been in the direction of the aneurism, had become in a considerable measure diverted in this channel.

So, in the height of each tracing, we have the evidence (considering the greater frequency of the pulse) of *greater force* in the current in the left side than there was before; and the amount of obliquity and dicrotism of the *lines of descent* show greater tension in the radial here than they did, and thereby prove a greater quantity of blood to have reached here in each wave-movement from the heart.

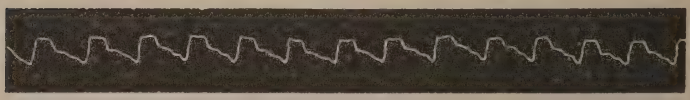
The great difference in the quantity of the blood sent to the left side before and after the operation can, however, best be seen by comparing the line formed by each collection ("ensemble") of tracings in Figs. 21 and 23. The horizontal character of that in Fig. 21 was referred to before, and the absence thereby indicated of any influence from the obstruction to the respiration, produced by the tumor pressing on the trachea, was then offered as evidence that the quantity of blood in the aorta was so small as not to affect

the line of the tracing when the aorta was pressed on by the expiratory movements of the chest. But in Fig. 23 we find this line of a decidedly serpentine character, showing, according to Marey's explanation, that the aorta must have been so distended that when its contents were crowded out by the contraction of the chest-walls, they were sufficient to produce such an amount of deviation in the line as can be noticed in this figure.

It is true, that at the time this tracing was made the tumor was larger and firmer than before, and the lungs were congested and stuffed with mucus, whereby the amount of compression exerted by the expiratory movement was much increased; and some of this serpentine character might, therefore, be attributed to those circumstances, but the effect which the condition of the lungs produced in this respect was possibly quite equalled by its influence on the quantity of the blood which reached the systemic side of the heart, for Herring and others have shown that such a condition of the lungs materially diminishes the quantity of blood flowing to the heart.

When the tumor had diminished nearly half in size, and the lungs had become freed, and the patient's voice, deglutition, and respiration, were all better (on the 24th, four days after the operation), we got a tracing from the right

Fig. 24.



radial, which showed, by its improvement in all the characters, that that artery was getting more under the influence of the movements of the blood in the heart and ascending aorta than it was the day after the operation. This effect is evident in the figure, even to the production of a slight serpentine form in the tracing. The further solidification of the blood in the sac, and the consequent diminution in the calibre of the channel by which the current was passing to the right

subclavian, had produced this effect. This tracing does not, however, show that the right side was even then as much under the influence of the circulation as the left was three days previous.

A careful study of the five figures which I have now given from the sphygmograph, will, I think, satisfy even the most skeptical that the theory proposed by Mr. Wardrop for the manner in which cures are made by his operation and by the unaided efforts of nature, is strictly correct. I might refer, in further confirmation of it, to the results of my thermometric observations in the case. They are, however, not so significant as the results from the sphygmograph, and the length to which this article has already extended warns me to refrain from any comments upon them.

ON THE

# TREATMENT OF CONTINUED FEVERS.

FROM CLINICAL LECTURES AT THE PENNSYLVANIA HOSPITAL,

DELIVERED IN THE WINTER 1867-8.

By W. W. GERHARD, M.D.,

ONE OF THE PHYSICIANS TO THE HOSPITAL.

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The subject of typhoid fever is one too extensive, of course, to be entered upon in the whole of its relations; but there are many points in connection with it, especially concerning the treatment of both typhoid and typhus fever, which may demand full attention from you. At present, I would confine myself mainly to the subject of typhoid fever, on account of its more constant appearance in the United States. Typhus fever as distinct from typhoid, however, I illustrated some years ago, in 1836, in a series of articles published in the American Journal of Medical Sciences, and I shall again speak of it if I have occasion during the winter to show you many cases.

Remember that typhoid fever is a disease which has its own course and its own phenomena, and that, if its symptoms offer nothing peculiar, the affection should be allowed to continue its course to recovery or death—to recovery in almost every case. What then is to be done in a case of typhoid fever? We must give the patient at the commencement of it a very mild laxative, which should consist of one or two teaspoonfuls only of castor oil, for in the course of typhoid

fever a very small dose of purgative medicine acts very energetically. Then, he should be kept throughout the whole duration of the disease in a condition of quiet. To do this, the first thing to be done is to avoid giving any disturbing medicine.

From the disposition shown by some physicians to act violently upon a patient affected with typhoid fever, you can at once determine their ignorance of the disease, and from the care which others manifest to avoid interfering with the natural course of the disorder, you know that they understand it thoroughly. Thus, I am accustomed after the disease is developed, to give the patient literally nothing which disturbs him. You are obliged sometimes to give medicine, not with the view of producing any positive action, but simply to cause the friends to imagine that you are doing something to change the condition of things, and also to soothe the patient himself with the belief that something is being administered which he can rely upon to lead the disease to a happy termination. In such cases I give simply spirit of mindererus, a tablespoonful three or four times a day, or every two hours. This is perfectly innocent.

There are some more energetic remedies which you may give with advantage under certain circumstances. If the patient has much fever at night, benefit will be derived from sweet spirits of nitre, in doses of half a drachm to a drachm, once, twice, or three times in the evening. Should the diarrhœa not be severe, nor any other symptom of serious import appear, this is the only treatment I would institute until near the middle period of the disease. Then, about the end of the second week there is an advantage in giving him some wine, from four to six ounces a day. If you have no wine, a little whiskey may be ordered in doses of from two to four ounces a day, or less, if the patient is at all excited by it. Wine may be given in its pure state or diluted with a little water, which is best, or in the form of whey, which is simply an inferior and weaker preparation of it. Any kind of wine, which is good and wholesome to the patient, may be chosen. The ordinary wine with us would be some

form of sherry, but claret or any other light and pure wine may be used; of course, the weaker kinds may be given in double the dose of strong sherry.

It must, however, be obvious to you, that it is entirely impossible to state the precise dose in which stimulants must be administered. Some patients, either from their peculiar condition of body previously to the attack, or from the depressing effect of the disease, will bear much larger doses than those which I have directed. Others again may need no alcoholic stimulant during the whole course of the disease; but the examples which would be benefited by such entire abstinence are very rare.

The food of a patient in typhoid fever should consist of some soft and mild articles, such as, for instance, arrow-root, or some other material which is unirritating and free from any hard particles. He should also take some animal broth. The best, of course, would be either beef or chicken broth. Beef broth may be given, but if the patient is much exhausted, it should be in the form of beef essence made in the usual way. That is, the old-fashioned mode is the most palatable and strongest. Cut the beef in small pieces and boil it in a bottle, having removed all the fat, for some hours. Season it to your taste, and be careful not to stop the bottle tightly before putting it on the fire in a pot of water. Eggs beaten up with some wine may also be given when the patient can digest them.

Other things must be attended to in connection with the case. Thus the application of cold is a very important one. Cold cloths should be applied to the head, and cold sponging over the upper part of the body, the head and face, whenever the fever is at all considerable. You may also apply to the lower extremities warm pediluvia or poultices, with the addition of mustard or hot bran bags to the legs.

The ventilation of the room in which the patient is placed is all-important. You must be very cautious to direct an abundant supply of fresh air in the room, and must utterly forbid the collection of a large number of persons in it. One or two only should be admitted at a time, and they

should be restricted entirely to the nurses, who are to take care of the patient, or his nearest connections. No visitors from mere curiosity should ever be allowed.

Attention must also be paid to the fires in winter. An open wood-fire is the best. If you cannot obtain it, you may use the ordinary means of heating a room by stoves or by heated air, taking care to give free ventilation and to change the air from time to time. If you can command the room, always choose one of moderate size; never put your patient in a close, confined apartment. These precautions of avoiding any disturbing influences, giving full ventilation, a proper diet, and a moderately warm temperature, are all-important throughout the course of the disease.

Towards the close of the disorder, however, it is necessary to increase the diet. About the third week you may give him a diet composed of some soft animal food, such as chicken pounded up. But always, during convalescence, we must still restrict him to a diet composed of soft materials, until he is perfectly able to sit up and go about. If you are not careful about this, you may meet, every now and then, with some unfortunate case in which the patient dies suddenly, in consequence of the tearing apart of the half-cicatrized ulceration by the passage over them of some undigested food.

This includes the management of an ordinary case of typhoid fever, with no irregular symptoms at all.

The next thing to do is to attend to such symptoms when they originate. First. As to the condition of the bowels. If there are more than two or three discharges in the twenty-four hours I would consider it of importance to check the tendency to diarrhœa which exists. For that purpose I give a small dose of opium, for opium acts on typhoid fever in very small doses. The patient should take only one-fourth of a grain of opium or five or six drops of laudanum twice or three times a day, if necessary. This will generally check the diarrhœa; or an injection, composed of ten drops of laudanum, may be administered. The object of this treatment is, of course, to quiet the irritability of the bowels, to relieve

the pain, and to check the peristaltic action, which, of course, tears asunder the ulcerations which exist in the small intestines. If you place the patient upon this treatment in the early stages of the diarrhœa, you can generally check it. Thus you have seen in all our cases we have had no trouble, by giving them opium on the first appearance of the symptoms, if they proved at all severe. Still, opium should not be used habitually in the treatment of typhoid fever, but only in those cases in which the diarrhœa becomes severe. I have never seen any mischievous results from its action upon the brain, but I do not consider it often advisable to give it, except with the view of making an impression upon the intestinal canal.

You will always find in typhoid fever, more or less disturbance of the brain. In very mild cases this amounts to simply a slight form of delirium, so slight that it would hardly be recognized at all, unless the patient be carefully examined at different hours of the day, when you will almost always find the mind a little wandering. In more severe cases the delirium becomes very great, and in some instances we find coupled with this delirium a great deal of stupor. When this condition of things exists to a great degree, it always requires attention. I would occasionally, when the patient's face is flushed and his eyes are congested, apply to the back of his neck or temples, three or four cups to take away as many ounces of blood, or apply some leeches. By a little local depletion of this kind you may generally remove this unfavorable condition very easily. But, there is another remedy which is much more effectual when these symptoms occur at the later stages of the disease. Then, of course the blood contained in the system becomes very thin, and is comparatively small in quantity, on account of the exhaustion of the patient. Under such circumstances, little benefit would be derived from cupping or leeching. You will then find that the application of a small blister to the nucha, three inches by four in size, or one behind each ear, about one and a half inch in length, will be of great service. This treatment is particularly applicable to cases

in which the patient's eyes become to a certain degree injected, the pupils contract and may even remain permanently contracted sometimes, he complains much of the impression of light upon him, and is evidently in a condition threatening the occurrence of meningitis.

Headache, or a slight congestion of the brain, is a disagreeable symptom, for which I would apply cloths dipped in cold water, or whiskey and water to the forehead and temples, and warmth to the feet.

Then as to the condition of the lungs and chest. In some seasons of the year and in certain years, there is a strong epidemic tendency to inflammatory affections of the chest in typhoid fever. You are of course aware that there is in every case of the disease more or less bronchitis, but in an ordinary case it is excessively slight. There is a great deal of mucous and of subcrepitant rhonchus found at the back part of the chest at some period or other in the disease, but this is sometimes found to pass into bronchial respiration, and into a coarse crepitant, or an ordinary crepitant rhonchus. Under such circumstances, it is important to prevent the development of the pneumonia, which is then threatened. Now the usual treatment for pneumonia may be adopted, that is to say, the local treatment. You may use in the early stages of the disease cups to the chest in the same manner as in the affections of the head; but these should be confined altogether to the earlier stages. In the more advanced state of the disease I would rely upon a blister to the chest, or I would place upon the skin moist heat, such as bran bags or some other application of that kind, tending to divert the blood to the exterior of the body. Besides this, you are also obliged occasionally to give them some remedy which relieves the cough and difficulty of respiration. There is no remedy which answers so well under such circumstances as a little ipecacuanha combined with a minute quantity of opium. I give the patient usually about ten drops of wine of ipecacuanha every two or three hours with twenty drops of paregoric. Of course, all of you would prefer the wine of ipecacuanha to the syrup. Both

of these remedies act equally well if they are good, but as the syrup is half the time in a decomposed state, you cannot rely upon it with certainty, which you may do in prescribing the wine. This is one of those criteria by which I would determine whether a physician has really studied the action of remedies in the treatment of disease. In fact, for any useful purpose we may consider the syrup of ipecacuanha to be perfectly nugatory.

You should, in an ordinary case of typhoid fever, give the patient diluent drinks, to act as a mild application to the intestinal canal, such as rice-water or gum-water; but in these cases of chest complications it is imperatively necessary to give them some preparation of this sort.

There is another symptom which occasionally becomes severe and dangerous in typhoid fever; that is, the occurrence of hemorrhage from the intestine. When this takes place, even to a slight degree, it is always necessary to attend to it. Thus I would give a patient who was affected with even a slight hemorrhage from the bowels a quarter of a grain of opium three or four times a day at least. Sometimes you may be obliged to increase this quantity to three or four times as much. You may also add to it a little tannin; about three grains will be found to be enough in ordinary cases of typhoid fever; remembering the rule I have already laid down, that all medicines should be given in rather small doses in typhoid fever. Thus three grains of tannin are not enough in other affections, where we are obliged to give at least five grains to produce an effect, but will be found sufficient in typhoid fever. In many instances it is preferable to give the opium alone, without the addition of any other remedy.

Sometimes in typhoid fever you will find abscesses occurring at the end of the disease. They take place in several parts of the body. Thus in one of our patients we showed you a threatened abscess at the parotid gland, which, however, we succeeded in dissipating by the usual repellent remedies applied to the part itself. But where the disease has gone on to suppuration, of course, there is nothing to

do but to employ the ordinary treatment for a suppurating abscess.

By this course of procedure you will find that cases of typhoid fever generally end very happily. There is an exceedingly small mortality in the ordinary varieties of it. In one succession of years at this Hospital I remember I had nearly eighty cases. Of these eighty cases I lost but one, and that one was lost under circumstances which were very unusual. Not that the mortality will ordinarily be as small as that, but still it will be comparatively slight if you attend carefully to the rules just laid down.

Some physicians, when called to a case of typhoid fever, are always disposed to disturb a patient. They take away sometimes a large quantity of blood; some of them purge actively, and others keep up a variety of irritating remedies throughout the whole course of the disease. Thus in one epidemic, which prevailed some years ago in a distant part of Virginia, an immense majority of the persons affected with it died. In a neighboring village a physician of eminence informed me that several patients affected with the disease took refuge with him the moment they were taken ill, and he found the mortality not at all greater than usual. But these fatal cases were subjected to a very singular treatment,—they were all placed upon the use of calomel, which was given so largely that all the calomel in the village disappeared, and the physician was obliged to send to Richmond for a fresh supply.

A remedy, which has attracted a great deal of attention within the last few years, is the spirits of turpentine. Many medical friends of mine never treat a case of typhoid fever without administering it, and give it often through a considerable part of the disease. I must confess, from my own experience, I cannot think it of much value. I do not believe it in any case positively injurious, excepting that it may disorder the stomach of the patient, and in that way do mischief; but, in ordinary cases of typhoid fever, I consider it perfectly nugatory. The only instances in which it seems to me to do good are when the disease is nearly ending, and

the tongue suddenly cleans and becomes a little dry. Under such circumstances the oil of turpentine may be administered, in the hope of removing this condition of things, in the dose of ten drops, made into a mixture, every few hours. In the little value I attach to the spirits of turpentine, I am sorry that I differ so widely from the opinion of my respected friend Dr. Wood, who attaches much more importance to it.

We have some other remedies which are particularly serviceable towards the close, that is, towards the end of the second week of typhoid fever. Among them I place quinine. I give the patient usually, in the course of the second week, from six or eight to ten grains of quinine a day in solution. This acts as a gentle stimulant to the intestinal canal and keeps up the strength of the individual. Still, of course, I do not consider it absolutely necessary in the management of this disorder; for, in typhoid fever, you may be assured the main circumstances to be attended to are to abstain from doing the patient mischief, and to place him in the most favorable condition to recovery, without giving him large quantities of medicine. Still I am accustomed to use quinine in the manner indicated, and have never found any disadvantage from it.

You know that typhoid fever occurs particularly between the ages of fifteen and thirty years of life; but we also find it in young children, in whom the disease is not very different from that in adults, excepting that its course is a little shortened. In these cases, too, I consider it necessary to follow out very nearly the course of treatment which I have already laid down to you, but you are obliged to watch more carefully the condition of the brain than in adults. In old persons typhoid fever becomes rare. Still it is occasionally met with even to a very advanced period of life. There is nothing peculiar in the treatment of persons who are beyond the age of thirty. They require very nearly the same medication as those who are younger. We are, however, often obliged to give them a rather larger quantity of nourishment (remembering it should be of the soft kind), and of stimu-

lants. The quantity of stimulants used, is also modified to a great degree by the habits of the patient previous to the disorder. If he has been accustomed to their use, of course he becomes less susceptible of their action and requires a larger dose. There are no invariable rules as to this, however, for we find sometimes that persons who have not been in the habit of taking stimulants, in their ordinary health, both bear and require large doses of them when ill. The condition of the patient should be carefully observed during their administration, as a guide to the amount. I sometimes give them in very large doses, and in many cases I consider them totally unnecessary.

There is another circumstance to be watched in the treatment of typhoid fever when it occurs in males. Sometimes there exists a certain degree of irritability at the neck of the bladder which ends at last in suppression of the urine. I have known a number of cases of the kind where the patients had their bladders enormously distended. Under such circumstances there is but one means of relief, and that is to introduce a catheter and draw off the water as early as possible, which operation may require repetition at least twice a day. To prevent the occurrence of such an accident, attention should be paid to the bladder, by carefully inquiring into the condition of the urine, in all cases in which the stupor of the patient renders him half unconscious.

After typhoid fever you will often find that individuals who have been affected with it do not get perfectly well for a good while, that is, they are threatened with other disorders. Of these the most dangerous is, of course, the development of phthisis. Any one whose experience with typhoid fever has been extensive must be aware that patients, after recovery from the fever and after returning to their usual occupations, sometimes become gradually a little emaciated; they cough, and then the symptoms of phthisis make their appearance. This should always be looked upon as possible, and after treating typhoid fever you should carefully examine the condition of the lungs and inquire into the whole health. In order to bring about a perfect restoration, I often consider

it advisable for the patient to give up his usual occupations for a while and to change his place of residence for a time. Let him, for example, take a little journey, either to the seaside or mountains, if it be summer; or, if in winter, he may simply move about a little, and not return for a while to any severe or depressing labor either of mind or body. The object of this is, of course, to restore his functions and to do away with that depressed condition which is apt to lead to tubercular disease. Then, also, we find that sometimes patients have an indifferent appetite, and impaired digestion for a long while. In order to remove this, regulate their diet and give some light, bitter infusion, such as quassia, or gentian, or chamomile during the whole of convalescence. A little ale or porter then becomes very important, but ale or porter I do not use much during the course of typhoid fever, not that I consider them positively bad, but because they are less concentrated, and their action cannot be so readily measured as that of the ordinary forms of alcoholic stimulants.

Very often, after an attack of typhoid fever, you will find that women complain bitterly of losing their hair, and men, in like manner, will lose it also. Under these circumstances, there is nothing to do but cut it off short. Almost always it springs up again as usual, but for a while it may occasion a good deal of discomfort.

There is another disease which, in many respects, bears a certain relation to typhoid fever. Of this I have shown numerous examples to the class during the twenty-three years of my attendance at this hospital. It is the English or Irish Typhus, as it was formerly called. This disease was first studied at Philadelphia in the year 1836 by my late lamented colleague, Dr. Pennock, and myself, at the Almshouse Hospital. The results of our observations I published at that time in the American Journal of Medical Sciences. It differed totally from typhoid fever in the character of the lesions, there being no distinctive anatomical lesion at all existing in the disease, excepting the condition of the blood, which was evidently somewhat altered from its normal condition; the

intestines and mesenteric glands remaining in a state of perfect integrity. This disorder we were enabled to prove was totally different from the typhoid fever of France, described so minutely by Dr. Louis, with which we had been familiar for many years. Since that time it has from time to time appeared in Philadelphia and in many other parts of the United States, particularly at the sea-ports.

The most distinctive feature between it and typhoid fever is its eminent contagion, no disease being more capable of transmission from one to another than typhus fever. To so great extent does this exist, that at the New York Hospital a ward which had been appropriated for some time to patients affected with it, was at last freed from them and the walls scraped and carefully cleaned. Of the men who were engaged at this work, in perfect health, the majority of them fell victims to this disorder, which they quickly contracted.

The treatment of this variety of fever differs in many respects from typhoid fever. In the first place, ventilation should be even more thoroughly insisted upon than in the last-mentioned disorder, and should be made as perfect as possible, with the exclusion of all persons not positively required for nursing the sick. The diet should consist of light articles of food, but as there is no intestinal inflammation, it is not necessary to insist upon the absence of any solid material, which may be allowed much earlier than in typhoid fever. Besides, it is necessary in this disorder to give the patient some stimulants. They should mainly consist of alcohol in some form, either wine, brandy, or whiskey, which must be given in such doses as the patient may bear. Some will require large doses, others will do well under very small portions. There is no means of determining the quantity which is required, excepting by the observation of the physician.

It is also necessary in this disease to attend to the condition of the bowels. They should be kept slightly open by laxatives. No powerful purgatives should be administered, for they would seriously enfeeble the patient. Light diapho-

retic drinks, such as spirits of mindererus, with half a teaspoonful of nitre, every few hours, may also be given.

The condition of the patient should be closely watched, as in many cases death occurs from the great congestion of the brain, which comes on very early in this affection. Under these circumstances, I consider it advisable to insist very strongly upon the treatment by means of dry cups or sometimes one or two cut ones applied to the back of the neck. Occasionally, also, a blister is borne well, for I have not seen any disadvantages resulting from blisters to the back of the neck in this disorder, and very rarely from blistering in any other part of the body, although sometimes a slight tendency to sloughing will manifest itself when the blisters are applied to the lower extremities. Cold applications to the head, such as whiskey and water, or simply water, and cold sponging of the body generally, are all advisable at times in this disorder.

It is also necessary to observe occasionally the condition of the chest, for the great congestion of the lungs which sometimes occurs in this disorder may produce a low variety of inflammation, and patients occasionally will die of accidental pneumonia, developed during the course of the disease. The best way of treating this is by external applications, such as sinapisms and blisters, remembering to place them near the axilla and not upon the back, which is apt to become irritated by the patient's lying upon it.

It is, besides, a matter of great importance to purify the air of the sick-chamber, and to prevent, as far as possible, the contagious exhalations of typhus fever from diffusing themselves amongst the friends or nurses of the patient. I generally direct chlorine to be mingled with the air of the room, by placing saucers with some of Labarraque's solution about the bed, or any other disinfectant which may be preferred.

When convalescence is approaching, the use of quinine is highly serviceable. It may be given as a tonic, in addition to the stimulus, in doses of from eight to ten grains a day, until the patient recovers his health entirely.

In this way you will almost always succeed in curing this

disorder, provided you attend carefully to the ventilation and give the patient a sufficient quantity of nutritious articles of food. The essence of beef, chicken broth, &c., are necessary during the whole course of the disease, and, as no ulceration of the bowels exists, the same avoidance of all solid food is not required as in typhoid fever.

Thus you will see, that in the main, the treatment of typhus fever does not differ very essentially from typhoid, although in the one disease we have a lesion of the intestines, while in the other we have none. Typhus fever is to be ascribed entirely to the blood, while in typhoid we admit, beside the alteration in the blood, the existence of a local affection; nevertheless, both of them must be treated as disorders which have a natural course, the duration of which cannot be suppressed by any treatment, the necessity for any interference in either case being governed entirely by the need of keeping up the strength of the patient until convalescence is established.

When recovery takes place, as it generally does in typhus fever, it is more rapid than it is in typhoid; the disease is also of less duration: thus it may be set down as not lasting usually more than fifteen or sixteen days. When it exists as an epidemic, a small dose of the poison producing it seems to be taken in by one individual as compared with another, and thus the time for its elimination, there being no internal lesions of permanent character, is very various. I have found it to vary from a few days up to three or even four weeks. It sometimes recurs from time to time. It does not, as in typhoid fever, attack a man once only, but some individuals suffer from it again and again. Those who are permanent nurses when a severe epidemic exists may be taken with this disorder upon several occasions. At the same time they may often resist it by good nourishment, some stimulus, and a little quinine during the period which elapses between these attacks.

It is of importance for you to keep in mind the occurrence of this fever, for you will find every now and then it makes its appearance in most unexpected localities. At first, those

who have never seen it are excessively confused when they meet with cases of this sort; they are not able to recognize their true nature until they have lost a number of patients,—learning the character of the disorder and the mode of treatment from the unfortunate victims who fall under their hands, instead of becoming familiar with it by study previously to treating it.

In France, within a few years past, particularly since the Crimean war, where typhus fever prevailed to a very large extent, attention has been strongly called to it, and they now recognize it as a disease which has a separate existence, instead of confounding it with typhoid fever. Previous to this time almost everybody in France imagined there was but one continued fever, and could not understand the different accounts of it given by English practitioners. It had, however, prevailed in France where the convicts were collected together, although it was not known as a disease having a peculiar course.

Occasionally you will meet with cases having some of the symptoms belonging to typhoid and typhus; especially when both disorders are epidemic, when you may sometimes find it difficult to discriminate between them. Doubtless this was the cause of the confusion among the English physicians, with whom the most common disease was typhus fever, in some cases of which many of the symptoms strongly resembled those of typhoid fever, while, on the contrary, in some pronounced cases of typhoid fever, the symptoms belonged rather to typhus. These were real instances of the connection of the two disorders, such as is met with in other varieties of fever.

The mortality of typhus fever varies exceedingly, and is to a certain degree independent of treatment. Thus, in some epidemics it is very fatal, in others, it is rarely mortal if treated with judgment. You will find the mortality influenced very much by circumstances within your control; thus, if the patients are huddled together in close rooms without ventilation, with indifferent food and imperfect means of treatment, there will be an immense mortality.

There is another variety of fever which I wish to speak about, namely, remittent fever. In ordinary cases, this is a very readily managed disease, yielding almost no mortality. Occasionally, however, it becomes more severe, particularly in certain localities in the United States, thus, on the coast of North and South Carolina, on the lower part of the James River, and on numerous other parts of the coast of the Southern States, it is often exceedingly fatal.

The mode of treating it must be familiar to you all. You know it consists in administering quinine with some diaphoretic medicine, and in keeping the bowels regular, and not in giving large doses of calomel and purgatives, which are not necessary, except in a few instances, but which unfortunately have been adopted too much as a general mode of treatment. But every now and then you will find that these cases instead of yielding in from ten to twelve days, which is the usual duration of remittent fever, become prolonged for a long time. These are cases of remittent fever which pass into continued fever, assuming the course of typhoid fever slowly and gradually, so that you may have after the entire ending of a case of ordinary remittent fever, typhoid fever with the usual features to contend with.

Under these circumstances of the disease, with which I have been long familiar from my practice at this hospital, you have a number of things to attend to. In the first place, the diet of the patient must be very sustaining and nourishing. In regard to medication, powerful purgatives must not be administered, nor any bloodletting performed. It may be necessary to place various applications, as cups or leeches, on different portions of the body when they are affected with congestion or inflammation, or the occurrence of severe diarrhœa may require attention. But what I wish to call your attention particularly to, is the fact, that these cases of remittent fever at the beginning passing into typhoid fever are often the cause of confusion with physicians, embarrassing them in their treatment, as they do not imagine that one disease may extend itself into the other, or that the local mischief of one may be ingrafted upon the other.

Thus, instead of there being merely a slight affection of the liver and spleen, and stomach, which exists in remittent fever, you may find also, the affection of the bowels and mesenteric glands which is peculiar to typhoid fever, together with an altered condition of the blood. I would, therefore, give such patients freely quinine and stimulants, and apply to the organs which may be involved such remedies as have already been directed in typhoid fever. Under this mode of treatment you will not find this variety of disease much more fatal than others.

While speaking on the subject of fevers, I would call your attention to the occasional passage of intermittent fever into remittent. Every physician who has practised much in miasmatic countries has become aware of this peculiarity. This connection is more close and much more natural than that between remittent fever and typhoid. When the patient has been exposed to a severe dose of the miasmatic poison, he is apt to have the variety of paroxysmal disease known as remittent fever; when the poison is less in quantity, it generally acts so as to produce only intermittent, but in both cases there is no fixed primitive alteration of the tissues; while in both the whole mischief must be ascribed to lesions of the blood. Thus, in intermittent fever the blood is changed and becomes watery, losing its red particles. In remittent fever the same changes take place, whereas, in typhoid and typhus fevers the blood becomes altered and not merely thin and watery. Therefore, it is necessary to treat intermittent fever almost exclusively by bringing about a healthy condition of the circulating fluid by the administration of quinine or some other antiperiodic, quinine being the best, together with iron. In that way, with frictions over the body, and appropriate nourishment, health can usually be restored.

It is of importance in intermittent fever to guard against returns of the disorder, for so long as paleness of the skin remains, with that peculiar sallowness of hue developed in it by the disease, the man cannot be said to be well. He is still laboring under the affection, although the paroxysms may be

suppressed. Under such circumstances we are obliged to resort from time to time to the use of antiperiodics, giving from five to ten grains of quinine at one time, which is the best dose. I give the quinine, if the patient be not averse to it, simply diffused in water. If he dislikes it in water, you must make it in the form of a solution, with the addition of a little elixir of vitriol. If he will not take it in this way, administer it in the form of a pill.

Another variety of fever, with which, fortunately, we have not been troubled for many years past in this latitude, is yellow fever. As for the treatment of this affection I can give you little from my own experience, which is limited mainly to an epidemic which occurred in Philadelphia about ten years ago in a limited section of the city. In this disorder we found that if we did not command the disease from the very beginning, we failed almost entirely. If, however, we commenced the treatment very early it was more manageable. From the experience of physicians who have practised most in Southern climates, I believe that the best mode of managing this affection is to attend simply to the hygienic circumstances which are necessary for the case. Thus I would place the patient absolutely at rest, give him a little medicine to open his bowels, and then trust to diluent drinks throughout the course of the disease. Quinine, you know, has been used very largely. From my experience in this hospital, I would say its effect was very trifling, nor do I believe in the South they have succeeded very much better with it. A number of remedies have been suggested. Some of them, it is claimed, were specifics against the disorder, but upon full trial none of them have been yet found to possess the character of really curing it. Whether this is true of some recent remedies which have been suggested in the English West Indies I cannot yet positively speak, as we do not yet know from the authority of large experience whether they are as successful as has been asserted.

There is one fortunate circumstance with yellow fever which should be borne in mind, and that is, that in some epidemics it is very mild. It would seem that the disease

is hardly fairly marked in such cases, whereas in others it is unfortunately exceedingly destructive. We find, also, that it, like the other varieties of fever of which I have spoken, is a blood disease. The whole aspect of the individual, the color of the skin, the yellow hue of the discharges which take place from his bowels, and the black vomit, which is nothing more nor less than an effusion of blood in an altered condition, all show us that the fever is to be looked upon as a blood disease. It is, therefore, to be treated with reference to the general condition of the individual, and not with reference to local lesions, which are, comparatively speaking, unimportant, rather following the disorder than preceding it.

There are some other varieties of fever which are occasionally met with. One of them occurred in Philadelphia some years ago at the Almshouse Hospital, and was not, I am ashamed to say, recorded. There were some hundred of cases there; no history whatever was given of them. An epidemic of the same disease had, however, appeared at the Almshouse Hospital many years ago, and of this a slight notice was given in the journals of Philadelphia by Dr. Condie and others, at a time, however, when the attention of pathologists was not so closely drawn to varieties of fever. This disorder was called Black Fever, from its occurring particularly among blacks, but not exclusively, as it affected whites, although not so frequently. It was marked by considerable disease of the liver, jaundice almost always taking place, with symptoms of great exhaustion, and was exceedingly fatal.

We also find that, from time to time, there occur epidemics of fever having their peculiar features in various localities. These it is impossible to classify under any varieties which are generally admitted now, nor do they occur with sufficient frequency to render them matters of great importance. Among them is to be classed, however, a peculiar form of disease, which, in many respects, belongs to the class of fevers. This is what is called Spotted Fever, or, as it is sometimes termed, "cerebro-spinal meningitis," from the occurrence of meningeal inflammation in a large number of

cases. Still, any one who has observed this disease carefully must be aware that it presents certain peculiarities very different from ordinary meningitis, as, for instance, the occasional rapidity with which it kills. While, therefore, we have occasionally the symptoms connected with meningeal inflammation developed during the course of the disease, yet these are by no means so decided, nor so regularly developed as they are in the ordinary cases of disease. Besides this, we have in this disorder a peculiarity which is rarely absent; that is, the occurrence of spots over the body, very different from those of typhoid and typhus fevers, and consisting apparently in little effusions of blood beneath the skin. This shows that the cause of the disease must be looked for in the condition of this fluid, and not in the inflammation which supervenes upon it.

This affection requires, in the first place, attention to the general health of the individual, keeping up his strength, and attention, in the second place, to the inflammation of the membranes of the brain which may occur in the disease. This disorder has not been confined to the United States, it has appeared in several parts of Europe. At first it cannot be readily recognized, as the symptoms neither indicate the local affection of the brain, nor point to an ordinary variety of fever. After it has continued for a while in a place, it is easy to discriminate between it and other varieties of disease, and then we may apply our remedies both to the brain and to the body generally.

After finishing the remarks which I have already made to you with respect to the treatment of fevers, I would wish to glance at their pathology. We find in every variety of fever that the lesions which exist after death are insufficient to account for the symptoms, although these are well marked in each case. Thus in typhoid fever it is absurd to suppose that the lesion consists exclusively in the inflammation and ulceration of the glands of Peyer and Brunner, and in the inflammation of the mesenteric glands, which is strictly dependent on the other disorder. On the contrary, we find that although these lesions occur in every case, and some-

times attract notice from their local symptoms, as the severe diarrhœa and hemorrhage, yet they do not constitute the disease; for we find that the only evidence of real disorder consists in the altered condition of the blood. We must ascribe in any case the lesion to the effects on the economy of a general disorder, which appears at the very commencement, and gives rise to them, rather than is directly produced by them. In like manner when we examine into the subject of typhus fever, we discover that there is no local lesion whatever of importance. There are, it is true, sometimes disorders of the spleen, and affections of other organs, but these are not settled nor fixed, and with the exception of the blood disease, which is still more evident in these cases than in the varieties of typhoid fever, it is utterly impossible to arrive at the cause of the disease by reference to any particular physical change. In intermittent and remittent fevers the alteration of the blood becomes still more obvious, more tangible; we can, as it were, place our finger upon it. In every case of these diseases the blood is at once rendered more watery; it contains a diminished number of red globules and a lessened quantity of lymph. This altered condition of the blood, if it continues for a long while, will give rise to other changes, which are not to be looked upon as the essential, leading characteristics of the disease. Thus affections of the liver and spleen are brought about, and both of them may remain afterward, interfering with the restoration of the patient to his usual health. So, in yellow fever, the lesions are comparatively unimportant. With the exception of the altered condition of the blood, which gives rise to black vomit and involves at last the whole economy, we find no physical change sufficient to indicate the cause of the disease.

In all these varieties of fever, whatever they may be, we find that invariably we must look to the diseased condition which takes place at the very commencement, and to which our attention should be drawn as the starting-point of the disorder. Hence, it may be said that for a number of years past, the attention of physicians has rather been drawn away

from the true method of studying these affections. At one time it was laid down as a rule that fevers should be studied with reference to their symptoms, and not with reference to the lesions. Afterwards the introduction of pathological anatomy induced physicians to pay too much attention to the structural changes, and to ascribe the symptoms to them, instead of looking upon the symptoms as the starting-point of the disorder, and as connected with the general disturbance of the system, which gave rise to the local lesions.

During the course at this hospital you will have ample opportunities for observing many cases, other than of fevers, which illustrate the same peculiarities of disease which I am now laying down. Thus, for example, I do not consider phthisis a local lesion. It is true that the tubercular disease produces certain changes in the lungs, and by these changes in the lungs we are accustomed to trace the progress of the disorder, but this does not constitute consumption. Tubercular deposit may begin in other parts of the body, yet the disease is of the same character as if it involved, in the first place, the lungs. Thus there are cases of tubercular meningitis, such as occur in young children, in which the first appearance of disorder consists in inflammation of the brain. These were looked upon at one time as instances of a perfectly separate disease, to be treated by cupping, leeching, or blistering over the whole head, and other potent remedies. It is now well known how futile such efforts are; and in this matter I may claim a certain degree of early authority in settling the nature of these affections by a series of observations which I made in 1832 and 1833, in Paris in concert with Dr. Rufz, by which I established that tubercular disease of the brain was perfectly incurable. We can, however, sometimes succeed in preventing the deposit of tubercles when they are about forming, but when they have once occurred in the brain, it is utterly impossible to get rid of them.

Tubercular deposit may also make its appearance primarily in the peritoneum, in the liver, and in other parts of the body. So in this disease, as in all other affections of the

kind, we must study the circumstances which give rise to tubercles, and which favor deposit, and the manner in which it may be prevented. When you trace the history of cases of phthisis you can ascribe them to other causes than the mere inflammation of the lungs: sometimes to direct inheritance, sometimes to the influence of contagion, so called, that is, to the influence of the propagation of the disease, as from husband to wife or from wife to husband. This matter of guarding against contagion I look upon as of the utmost importance for every physician to insist upon. By proper care he will often succeed in preventing the transmission of tubercular disease from the husband to the wife, and the reverse, and thus spare one parent to take care of the children, besides gratifying the wish which every physician has to preserve the lives of all committed to his charge. If, therefore, you find individuals sleeping in close rooms, and in the same bed, you ought to at least inform them it is highly possible for one to transmit consumption to the other. I have seen numerous cases of the transmission of phthisis from one person to another, sleeping in the same bed, the second individual sometimes dying of the disease while the one first affected continued to live, and, although not positively recovering, to enjoy passable health. I should set down the probability of consumption occurring in persons thus exposed to contagion, as husband and wife, two sisters, or two brothers sleeping together in close rooms, to be at least threefold greater than ordinary, if they be long exposed to inhale the exhalations from consumptive patients.

There is no doubt that, as to the transmissibility of consumption as well as of others, the opinions of the mass of mankind have been in advance of those of many eminent physicians. Thus as regards puerperal fever, two most eminent professors of midwifery at Philadelphia, used to maintain that the disease was in no sense capable of transmission by the physician from one patient to another. These opinions, from conscientious and generally well-thinking medical men, were in the face of a frightful diffusion of the disease

in the practice of a physician at Philadelphia some years since, while patients in the same neighborhood were attended by his brother physicians in entire safety. In the same way many persons are perfectly aware that consumption is thus transmissible by prolonged exposure to the exhalations of patients affected with it, although but few physicians seem to think of it. In the case of husband and wife, it is sometimes necessary to insist upon this fact, for the sake of the children, if the parents are so absurd as to expose themselves to such risks. The same remarks we have made as to the transmissibility of consumption, apply also to severe dysentery, to cholera, and to some other disorders.

You may readily see the mode of managing cases of this kind. They should be placed under the most favorable hygienic circumstances of air, exercise, and the like; thus you will often succeed in getting rid of the disposition to consumption in the most effectual way. When the disease is once developed, however, although the lesions are positive and fixed, they may be comparatively slight, or they may be well marked, and yet the patient not so much affected by them as to die in a comparatively short time. Thus you may know from other lectures that if I wished to insist more upon the subject of consumption at present, I should speak to you of the very great doubt which often exists as to its prognosis. In many cases the disease does not apparently shorten the life an hour, while in others death ensues in a comparatively short time. Therefore, always be cautious in telling patients they have consumption, which is interpreted by them to be a decree of death. This popular belief is of course an absurdity, for a person may live while laboring under tubercular disease nearly or even quite as long as if he were not affected with it. A medical friend of mine, when I announced to him, some years ago, that he had tubercular disease, laughed at the idea; nevertheless he had had consumption for many years, and is still the subject of it, although now past seventy.

Starting with a series of lectures on the treatment of

fever, we have passed into consumption, and we might go into a variety of other diseases, such as dropsies, &c., grouping together their symptoms and lesions and showing how far one is dependent upon another, and how unconnected with local structural alterations they often are.

A CONTRIBUTION

TOWARD OUR KNOWLEDGE OF THE PATHOLOGICAL CHANGES

IN THE

# FLUORESCENCE OF THE TISSUES.

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In a recent treatise upon the "Applications of Chemistry and Mechanics to Pathology and Therapeutics,"* Dr. H. Bence Jones gives an account of the existence in the textures of animals of a fluorescent substance, closely resembling quinia. While pursuing investigations in regard to the rate of passage of various substances into and out of the body, he selected quinia for special observation, because of that splendid test which led Professor Stokes to the discovery of the change of refrangibility of light.† The first object of Dr. Jones, therefore, was to determine the delicacy of this reaction for quinia; and he found, when the spark from a Ruhmkorff coil was the source of light, that a solution of one grain of quinia in 1,800,000 parts (*i. e.*, 117 litres nearly)

* John Churchill & Sons, London, 1867, lec. ii, p. 28.

† See Phil. Trans., 1852, ii, p. 463; Phil. Mag., vi, p. 304; Proc. Royal Inst., iv, Part III, No. 39, p. 229; Phil. Trans., 1862, p. 602.

of water, showed the blue fluorescence distinctly. He next observed, in comparing solutions prepared from the tissues of animals to whom quinia had been given, with those obtained from animals who had taken none of that substance, that although the former yielded a much more intense fluorescence, there was a very positive degree of this property in the latter. He was therefore compelled to recognize the existence of a substance in the tissues which closely resembled quinia in fluorescence; and upon further investigation he found that it possessed *all* the optical properties of quinia, and still further, that it answered every chemical test for this alkaloid. The only respects in which these two substances appeared to differ were, that the solution of the natural substance began to fluoresce a little before the solution of quinia (though, on carrying it through the spectrum, it ends where quinia ends), and that the fluorescent light of the natural substance was a little more greenish than that of quinia. For this substance, then, he has proposed the name of "animal quinoidine."

His solutions were prepared in the following manner: The fluid or organ to be tested was heated in a water-bath with very dilute sulphuric acid; and this extraction was repeated over and over again. The acid extracts were mixed and filtered after cooling, neutralized with caustic soda, and repeatedly shaken up with their own bulk of ether. The residue left after evaporation of the ether was taken up by dilute sulphuric acid, filtered, and tested for fluorescence. The degree of this was determined by comparison with the fluorescence of standard solutions of quinia of known strength, and accepted as an index of the quantity of "animal quinoidine" present. Pursuing this plan, Dr. Jones prepared the following table, showing the amount of fluorescent substance in different parts of Guinea-pigs and of man, measured by the number of grains of quinia in one hundred litres of distilled water, that yielded the same fluorescence:*

* At the conclusion of his article, Dr. Jones has given a *résumé* of the imperfect information on this subject existing previously to his own investigations. It was confined to a few statements by Professors Brücke, Helm-

| | In Guinea-Pigs. | | | In Man. | | |
|---|---|---|---|---|---|---|
| Liver, . . . . . | 6 to 3 | 6 | 2 | 2 | 2 | 2 |
| Lenses, . . . . . | 3 | 2 | 2 | 2 | — | — |
| Kidney, . . . . . | 3 | 2 | 2 | 2 | 2 | 3 to 6 |
| Urine, . . . . . | 3 | 2 | 2 | — | — | — |
| Bile, . . . . . | 3 | 2 | 2 | — | — | — |
| Blood, . . . . . | 3 | 2 | 2 | — | — | — |
| Brain, . . . . . | 3 | 2 | 2 | — | — | — |
| Nerves, . . . . . | 3 | 2 | 2 | 1 | 1 | 2 |
| Muscles, . . . . . | 3 | 2 | 2 | 1 | 2 | 2 |
| Humors of Eye, . . | 2 | 2 | 2 | — | — | — |
| Cartilages, . . . . | — | — | — | 3 | 1 | — |
| Spleen, . . . . . | — | — | — | 1 | 1 | 3 |
| Lungs, . . . . . | — | — | — | 1 | 1 | 2 |

Having thus determined the amount of animal quinoidine naturally existing in the tissues, Dr. Jones proceeded to ascertain the rate of entrance of quinia into the system and the increase of fluorescence caused by the introduction of a given quantity, by administering four grains of sulphate of quinia to Guinea-pigs and testing their tissues at various intervals thereafter. He observed that even in a quarter of an hour the fluorescence rose to 75; that the maximum effect of the quinia was reached in about three hours, at which time the fluorescence amounted to from 100 to 200, and occurred to this amount in the liver, kidneys, urine, bile, blood, brain, and muscles; that in six hours the effect began to diminish, in twenty-four hours it was considerably less than half as much as in three; in forty-eight hours, except in the liver and

holtz, and MM. Regnauld and Setschenow, in regard to the presence of fluorescence in the humors of the eye.

For remarks upon the fluorescence of æsculin, fraxin, and other substances, and for a discussion of the essential character of the phenomenon, the reader is referred to Graham's Chemistry, p. 671, and Elements of Chemistry, W. A. Miller, p. 156.

blood, there was but little more than natural, and finally in seventy-two hours none of the tissues showed any increase in the amount of fluorescence. The possible connection of these facts with the pathology and treatment of malarial fever would naturally at once suggest itself. And the following series of observations was accordingly entered upon with the view of determining whether there might not be, as an attendant upon the pathological processes in malarial disease, a rapid and marked diminution in the amount of animal quinoidine naturally existing in the tissues.

The various solutions were prepared in strict accordance with the process of Dr. Jones, as above described, and were tested by placing them in a Geissler's tube and passing a spark from a Ruhmkorff coil through them.

The tube employed was U-shaped, and the standard solutions of quinia, used for comparison, were introduced into one branch, and thus brought parallel to the solution to be tested.

In order to avoid the possibility of error from the accidental presence of some fluorescent substance either in the glass of the Geissler's tube, or in the distilled water employed in the preparation of the following solutions, these were first carefully tested, and found to be entirely free from any such property.

The diluted sulphuric acid used as a menstruum, in the final steps of the process of preparing the solutions, was also tested and found equally free from any fluorescence.

As the cases which were made the subjects of observation were treated with sulphate of cinchonia, and not with sulphate of quinia, it was deemed advisable to ascertain approximately, the relative degrees of fluorescence possessed by solutions of these two salts. Accordingly, a solution of sulphate of quinia, obtained by adding ten grains of the salt to a litre of distilled water, without the presence of any sulphuric acid, and allowing the mixture to stand with frequent agitation, for many hours, was tested and yielded an intense fluorescence. The addition of sulphuric acid to this solution increased its fluorescence in a small degree only.

A solution of sulphate of cinchonia, obtained by adding in like manner twenty grains of the salt to a litre of distilled water, without the presence of sulphuric acid, was found to possess positive fluorescence, though very much less intense than that of the quinia solution, which was of but one-half its strength. The addition of sulphuric acid to this solution did not render its fluorescence materially stronger. It must therefore be borne in mind that the increase of fluorescence noticed in Cases IX, X, XI, and XII, after treatment, would in all probability have been even much more marked had sulphate of quinia been administered to the patients instead of sulphate of cinchonia.

In order to establish the correspondence between our materials and processes, and those employed by Dr. Jones, the following specimen of healthy blood was carefully tested.

Case I.—Mary Dood, æt. 58 years, Irish, a washerwoman, of plethoric habit, who has lived in Philadelphia at Front and Callowhill Streets, for 15 years, and has never suffered with malarial disease, was admitted to the Pennsylvania Hospital, October 21st, 1867, with a fracture of arm and ribs. One fluidounce of blood was immediately drawn by wet cups, and when tested, yielded a fluorescence of three.

Having thus established the harmony between our results and those of Dr. Jones, we proceeded to examine the following series of specimens obtained from patients suffering with malarial disease. The blood in each case was drawn in carefully cleaned cups from the splenic region, and was subjected to treatment as soon as possible after abstraction.

Case II.—James Stewart, æt. 29, came under observation September 23d, 1867. Had been one month and three days in Cecil County, Maryland, picking peaches. He was taken sick September 9th, and had four paroxysms of tertian ague, since which the fever has been merely remitting, without distinct chills. Has taken at various times, twenty-five "Wright's pills," but no other medicine. Six fluidrachms

of blood were drawn September 23d, and on application of the test, yielded a fluorescence of one and a half.

Case III.—William Cassidy, æt. 24, came under observation September 29th, 1867, suffering with marked intermittent fever, which had received no treatment. Three fluidrachms of blood were drawn, and when tested, yielded a fluorescence of one.

Case IV.—Nearly four fluidounces of blood were drawn by wet cups from a young man, who was admitted to the Pennsylvania Hospital suffering with severe and untreated malarial disease, and, on being tested, yielded a fluorescence of seven-eighths.

Case V.—John Mooney, æt. 22, came under observation September 30th, 1867. Had never had malarial fever before. Had been in America sixteen months, and for four months had been living in Virginia, on the Potomac, and had suffered with tertian ague during the whole of September. Had taken no quinia, so far as could be ascertained. Half a fluidounce of blood was drawn, and on being tested yielded a fluorescence of seven-eighths.

Case VI.—Henry Hughes, æt. 24, came under observation September 30th, 1867. A German; one year in America, and for five weeks had been living in Philadelphia and working in a brickyard at Front and Poplar Streets. He had an imperfectly developed chill both on September 29th and September 30th. Seven fluidrachms of blood were drawn, and when tested, yielded a fluorescence of three-fourths.

Case VII.—John Koch, æt. 24, came under observation September 10th, 1867. A cooper by occupation, but three months in America. He had been working on a farm in New Jersey, and went for one night to Wilmington, Delaware, and then returned to Philadelphia to Callowhill Street. He had his first chill about August 25th, and afterwards

daily for five days. He then took some medicine and was free from chills for six or eight days. The medicine was bitter and was taken in teaspoonful doses three or four times a day. He again had chills on September 8th, 10th, and 12th, and immediately after the last one, seven fluidrachms of blood were drawn, and on being tested, yielded a fluorescence of two-thirds. It is quite certain that he had taken no quinia or cinchonia for a week before the abstraction of the blood.

Case VIII.—James Gardiner, æt. 48, came under observation September 11th, 1867. Had never before suffered with malarial disease, but contracted present attack on the Eastern Shore of Maryland. He had been attacked two weeks previously with tertian ague, which continued until September 6th, since when he had had but one chill, but had continued weak and feverish. He had been in Philadelphia five days, and before reaching here, had taken nine of "Wright's vegetable pills," which purged him freely.

He applied at the Philadelphia Dispensary, September 7, and obtained a bottle of medicine, of which he took a spoonful several times daily until September 9, and on that day obtained another bottle containing cinchonia, in all probability. He, however, according to his positive statement, vomited after each dose. He took the last dose on September 10, but vomited it instantly.

Three fluidrachms of blood were drawn on the morning of September 12, and on being tested, yielded a fluorescence of three-eighths.

As above noted, no cinchonia had entered his system for at least sixty hours before the blood was abstracted.

The results obtained from observations of the preceding seven cases may be more comprehensively seen by an inspection of the following table:

| Case. | Duration. | Character. | Previous Medication. | Fluorescence. |
|---|---|---|---|---|
| II. | 14 days. | Tertian. | 25 purgative pills. | $1\frac{1}{2}$ |
| III. | Indefinite. | Marked Intermittent. | None. | 1 |
| IV. | Indefinite. | Marked Intermittent. | None. | $\frac{7}{8}$ |
| V. | 30 days. | Tertian. | None. | $\frac{7}{8}$ |
| VI. | 5 weeks' residence in malarial district; imperfect history. | Quotidian. | None. | $\frac{3}{4}$ |
| VII. | 18 days. | Quotidian and Tertian. | Broken by quinia on 6th day; recurred on 14th. No quinia for 1 week before abstraction of blood. | $\frac{2}{3}$ |
| VIII. | 15 days. | Tertian. | Small doses of cinchonia, but vomited No medication at all for 60 hours previous to abstraction of blood. | $\frac{3}{8}$ |

Case IX.—Isam Woolever, æt. 19, came under observation September 12, 1867. Had been living in the western part of North Carolina, where he suffered with chills and fever from June, 1866, until March, 1867. He had had no well-marked chills since, but for the previous two weeks had had a slight chilly sensation each day, followed by fever. His spleen was greatly enlarged. He had taken no medicine, but six "Wright's pills" on September 1st, which operated freely.

Two fluidrachms and a sixth of blood were drawn, but on being tested, did not yield any positive degree of fluorescence, and it was very doubtful whether any was present.

September 26th. He has taken Cinchoniæ Sulph, gr. xx, each day since the last note, without other medication. There has been no recurrence of chills, but merely a chilly sensation on the 21st. Appearance much improved; though spleen is still very much enlarged. Again bled, and five and

a half fluidrachms treated, and found to yield a fluorescence of one and a quarter.

Case X.—James Gallagher, came under observation September 19th, 1867. Previously in good health, and living in non-malarious region, though he had a slight attack of miasmatic fever last year at Boston. Had been in Delaware for three weeks; felt poorly for several days, and then had a chill on September 11th. He took Quiniæ Sulph., gr. iv, the next day, and since then had had daily rigors at 1 P.M., followed by fever. Had taken no more quinia.

Five fluidrachms of blood were drawn on the 20th, and on being tested, yielded a fluorescence of three fourths.

26th. He has taken each day Cinchoniæ Sulph., gr. xx, without other medication; has had no recurrence of chill, but has steadily improved in condition. Six fluidrachms of blood were drawn, and when tested yielded a fluorescence of three and a half.

The interesting points in these two cases may be concisely presented as follows:

| Case. | Duration. | Character. | Medication. | Fluorescence in 1st Experiment. | Interval. | Indication. | Condition. | Fluorescence in 2d Experiment. |
|---|---|---|---|---|---|---|---|---|
| IX. | 15 months; during the first 9, paroxysms, and for last two weeks, Quotidian. | Quotidian. Spleen much enlarged. | Purgative Pills. | Doubtful if any. | 14 days. | Cinch. Sulph., gr. xx each day | Much improved; no recurrence of chill. | $1\frac{1}{4}$ |
| X. | Three weeks in malarial district; irregular symptoms for some days, and then Quotidian for 9 days. | Quotidian. | Quin. Sulph. gr. iv once 9 days before abstraction. | $\frac{3}{4}$ | 6 days. | " " | " " | $3\frac{1}{2}$ |

Case XI.—William McLaughlin, came under observation September 17th, 1867. He had been engaged in peach-picking in a swampy portion of Delaware, and had suffered with severe quotidian intermittent fever for four weeks. He had a congestive chill, with apoplectiform symptoms, on September 18th, at 11 A.M., after which he did not completely

recover his consciousness; and at 2 P.M. on the following day, had a second similar paroxysm, which proved fatal during the night. On the evening of the 17th, he took twenty grains of sulphate of cinchonia, and on the morning of the 19th, one or more doses of fifteen grains each. At the autopsy the spleen was found much enlarged and softened. Abundant pigment-matter was found in all the visceral tissues. Ten fluidrachms of the spleen were tested, and yielded a fluorescence of two and a half. Eleven fluidrachms of the liver were tested and yielded a fluorescence of two and a half.

CASE XII.—John Bower, æt. 17, came under observation August 6th, 1867. A German; has been in this country two years; living in Baltimore until three weeks before the above date. There is a history of chronic malarial cachexia of ten months' standing; attended, during the past three months, with marked general dropsy.

Ordered: Cinchoniæ Sulph. in full doses, with Basham's diuretic iron mixture.

September 18th. This treatment has been continued, and has produced decided amendment in all his symptoms. The dropsy has almost entirely disappeared, his strength increased, and his appearance improved in a marked manner.

29th. Soon after the last note symptoms of typhoid fever appeared, and despite careful treatment, including the continued administration of cinchoniæ sulph., he died on the ninth day of the disease.

At the autopsy the spleen was found enormously enlarged ($8\frac{1}{2}$ in. by 7 in.), and reduced in consistence to a soft, dark pulp. The liver was also enlarged, softened, and of a pale slate color.

Four fluid ounces of the spleen were tested, and yielded a fluorescence of six.

Four fluid ounces of the liver were also tested, and yielded a fluorescence of eight.

The most interesting points in these two cases are presented concisely in the following table:

| Case. | Duration and Character. | Medication. | Fluorescence of organs tested. | |
|---|---|---|---|---|
| | | | Spleen. | Liver. |
| XI. | Four weeks' Quotidian, the last two paroxysms congestive. | Cinchon. Sulph., gr. xx, 48 hours before death; and gr. xv or more 12 hours before death. | $2\frac{1}{2}$ | $2\frac{1}{2}$ |
| XII. | Ten months' chronic malarial cachexia, with general dropsy for 3 months. Death on 9th day from typhoid fever. | Cinchon. Sulph., in large doses, for 54 days previous to death. | 6 | 8 |

We have already alluded to the fact that in interpreting the last four cases, the very great inferiority of the fluorescence of sulphate of cinchonia, as compared with that of sulphate of quinia, must be borne in mind.

It will be noticed, on referring to the rate of diffusion of quinia through the tissues of the body, as ascertained by Dr. Jones, that in none of the above cases did the patient receive either of the cinchona alkaloids within so brief a period before the abstraction of blood that the degree of fluorescence could possibly have been influenced by its administration.

This series of observations, though unfortunately limited, owing to the rarity of cases which had not received more or less of one of the cinchona alkaloids before coming under observation, seems to indicate, by the uniformity of the results obtained, a close connection between the diminution of "animal quinoidine" and malarial disease. Whether such diminution be invariably a consequence of the action of the miasmatic poison in the human body can, however, only be determined by a more extended course of investigation. Still less can we attempt to deduce from the facts here presented any satisfactory estimate of the influence of the various types of malarial disease or of the duration of the disorder. But it would appear probable, as from Cases II and VIII, that a

comparatively short time suffices to effect a marked reduction in the normal amount of the fluorescent substance. It may also be inferred, with some confidence, that it is not essential for fully-formed febrile paroxysms to occur in order that this peculiar effect shall be produced. And, indeed, this would be in strict accordance with our knowledge of the well-recognized malarial cachexia, in which this insidious poison frequently produces its fullest and most disastrous effects without the development of any distinct pyrexia.

After these points have been determined it will still remain to examine the blood and tissues in many other pathological conditions, in order to learn whether it be only in malarial affections that animal quinoidine is materially diminished. Any attempt to explain the mode in which cinchonia exercises its curative action in miasmatic disorders must be suspended until this question is definitely settled.

We have already entered upon a series of observations with reference to this, and desire to take this opportunity of expressing our great indebtedness to Professor Henry Morton, of this city, for his kindness in placing at our disposal the apparatus necessary for conducting this inquiry.

# CASE

OF

# PENETRATING WOUND OF THE SKULL,

## IN WHICH THE BALL ENTERED THE BRAIN, TERMINATING IN RECOVERY;

WITH ANALYSES OF SIMILAR CASES.

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On the evening of June 13th, 6 P.M., Mrs. G——, æt. 21 years, married, was accidentally shot by her husband. The ball (weighing forty-eight and a half grains, five-sixteenths of an inch in diameter) entered the cranium, in the left temporal region, about a quarter of an inch in front of the junction of the helix with the tragus of the ear.

At the time of my arrival at the house, which was about fifteen minutes after the occurrence of the accident, she was sitting composedly in a chair, as if nothing whatever had happened. She informed me that her husband was standing at a distance of about ten feet from her, and that she did not experience any sensation of pain, nor did the injury produce any disturbance of the functions of the brain, in fact, the first intimation she had of being shot, was the trickling of blood down the left side of the face.

After placing her in the recumbent position, and removing some clots of blood, which matted down the hair and

concealed the real extent of the injury, I proceeded to examine, and found a circular wound in the scalp about one-quarter of an inch in diameter just in front and above the external auditory meatus, corresponding to which was an aperture of the same dimensions in the squamous portion of the temporal bone, without any coexisting radiating fractures.

I then passed in through the wound an ordinary blunt-pointed silver pocket probe, and found it to pass into the substance of the brain three and a half inches in a direction downwards, backwards, and inwards, without coming in contact with any resisting object.

Finding the wound to be of such a serious character, I desisted from any further exploration. About five minutes after the withdrawal of the probe, the patient was seized with an epileptiform convulsion, remaining in an unconscious state for three minutes; before the effect of the convulsion had passed off, she was again seized; this subsiding, she gradually passed into a placid sleep, and continued in this condition until 9½ P.M., after the arrival of Dr. Hewson, whom I had called in consultation.

The Doctor attempted to pass Nélaton's probe whilst the patient was asleep, but she moved as if in pain, and soon after awakened in a very excited state, and resisted all his attempts at examination.

We now gave her one-quarter of a grain of morph. sulph. by subcutaneous injection in the arm, which had the happy effect of producing quiet in a short period of time. The Doctor now made another attempt, and found the probe to pass in the brain in the same direction and distance as before stated, and without encountering any foreign body.

All operative measures, of course, were out of the question. We enjoined upon her friends the propriety of keeping her perfectly quiet, to avoid all undue excitement, her diet to be light and unstimulating, and liquor morphiæ sulphatis in f℥j doses, repeated, if at all restless.

June 14th, A.M. Her condition was very good, having enjoyed a good night's rest without the assistance of the drug. Pulse regular; skin natural; tongue clean; wound looking

well; no headache. P.M. Still doing well, slept at intervals through the day.

June 15th, A.M. As yet no bad symptoms. Pupils appear to be somewhat dilated. P.M. Slept well at intervals through the day.

June 16th, A.M. Slept well through the night; complains of slight dimness of vision; to her the room presents a smoky appearance. P.M. Dimness of vision still continues; in other respects doing well.

June 17th, A.M. Dimness continues; complains of her meagre diet. Pulse good, &c.; no head symptoms.

June 18th, A.M. Dimness of vision gradually disappearing. Pupils still a little dilated. Wound looks well.

June 19th, A.M. Dimness totally gone. Pupils have resumed their natural size.

It is unnecessary to proceed further with the minute details of the case; suffice it to say, that she progressed steadily towards recovery, without a single untoward symptom, when on July 11th, twenty-eight days after the injury, she sat up, and on July 13th, thirty days, was able to leave her bed; experienced only, and for a short time, a sensation of giddiness and a feeling of general weakness, a necessary sequence to her confinement in the recumbent position.

14th of August, sixty-two days after the accident, went out, feeling no inconvenience whatever. At the time of writing, four and a half months after, she is still well and enjoying good health, having no pain and no disturbance of the intellectual faculties.

In connection with the above case, I propose presenting a collection of some interesting cases of similar injuries, the majority of them being where the ball or shot remained in the interior of the cranium, producing little or no constitutional disturbance, in some few, the patient dying many years after from diseases entirely foreign to the injury. In collecting some of the cases, my thanks are due to Mr. August F. Müller, late Librarian of the Pennsylvania Hospital, and Prof. Robert Bridges, Librarian of the College of Physicians.

1. Dr. J. A. Buchanan, of Philadelphia, late Acting Assistant Surgeon U. S. A., communicated to me a case that came under his charge, while on duty at Summit House Hospital; that of a colored man, wounded at the battle of Cold Harbor, Virginia, June 3d, 1864, who had been struck by a musket-ball, in the squamous portion of the left temporal bone, the missile entering the brain.

After passing through a trying ordeal, suffering intense pain at times, and having great discharges of pus, with loss of brain-substance, but no disturbance of his intellectual faculties, this patient recovered, and was able to return to his regiment in three months after the injury.

2. Charles Payne, a Mexican soldier, æt. 20 years, was admitted into the Pennsylvania Hospital on August 11th, 1858, with two pistol wounds, one in the neck just above the right sterno-clavicular articulation, and the other in the centre of the os frontis. The latter made a small hole directly through the os frontis, the ball penetrating the brain. Symptoms of concussion, which he presented at first, were followed by those of compression.

The attending surgeon, Dr. J. Pancoast, applied the trephine, but the ball could not be found; some blood was removed from the dura mater, the wound left open, and cold dressings applied.

No immediate change followed the operation, but in the course of a few days he began to improve, and continued to do so gradually and uninterruptedly, when, on the 22d of October, seventy-two days after the accident, he was discharged perfectly cured; had been walking about the wards of the hospital several weeks previous to his dismissal. (Verbally reported to the Pathological Society of Philadelphia, by Dr. George C. Harlan.)

3. Charles W. Burd, æt. 26 years, 4th Maine Volunteers. Admitted into Hygeia Hospital from prison in Richmond, February 20th, 1862. Wounded at Bull Run, July 21st, 1861. He received a gunshot fracture of both tables of the os frontis at left frontal eminence. Penetration of the substance of

the brain by a portion of the ball (musket-ball). A portion of the ball was removed from under the integument, on the field. Seven months afterwards, the fistulous orifice of the wound was dilated, depressed bone was removed, and also a portion of the ball from within the cavity of the cranium. Returned to duty, March, 1863.

During his imprisonment he suffered from pain in head, but had no delirium, coma, or paralysis. (Circular No. 6, pages 18 and 19. War Department, Washington, 1866.)

4. John Stallman, private, 4th Pennsylvania Cavalry, æt. 21 years, was admitted into National Hospital, Baltimore, Maryland. Wounded at Winchester, Virginia, July 24th, 1864. Musket-ball entered at the right temple, and emerged at the opposite side of the head.

Transferred to Cuyler Hospital, December 10th, 1864. When admitted into National Hospital, his bowels were constipated, and nausea almost constant. His pulse was slow and feeble. His pupils were constantly dilated. When discharged, his mental operations seemed slow and uncertain, but there was no aberration of mind, and his memory was unimpaired. (Ibid., pages 18 and 19.)

5. Charles W——, æt. 22, private, 14th Virginia Infantry, was admitted into U. S. A. General Hospital, Frederick, Maryland, September 17th, 1864. Wounded at Berryville, September 3d, 1864, by a conoidal musket-ball. The missile entered the left temporal bone, one inch from the meatus auditorius externus, and penetrated the cavity of skull, lodging on the side of the sella turcica. About one-third of the ball was extracted from under the scalp in the frontal region by forceps.

When admitted, patient had paralysis of second, third, fourth, fifth, sixth, and seventh nerves of the left side. No pain in head, skin and bowels natural, general health good, consciousness perfect.

October 10th, 1864. Was so far recovered as to walk

about, and assist in nursing in the ward. If, however, he exerted himself too much, he suffered from headache.

While being transferred to Grafton, Virginia, November, 2d, 1864, he drank a large quantity of whiskey. The day after his arrival he had a violent chill, followed the next morning by convulsions and strabismus of right eye; these continued during the day, and coma succeeded on the following morning, and he died without reaction, sixty-four days after injury.

*Autopsy* showed the larger portion of a conoidal musket-ball resting against the sella turcica; the encephalon was extensively disorganized; the ventricles and nearly the whole base of the brain, bathed in pus. (Ibid., pages 18 and 19.)

6. Corporal G. W. S., æt. 29 years, 12th Massachusetts Volunteers, was wounded at Fredericksburg, December 13th, 1862, and was admitted to Camden Street Hospital, Baltimore, six days subsequently.

The humors of the right eye had been evacuated by a ball, which had likewise inflicted a slight wound of the lower lid. The left eye was observed to be unnaturally prominent, but its functions were undisturbed.

The patient did not complain of pain or any inconvenience, except a slight headache. There were no cerebral symptoms, and no one suspected that the projectile had entered the brain.

The wound healed kindly, and, after three weeks, he was able to walk about the city habitually.

He appeared to be well, except that he had an occasional pain over the left eye, until February 6th, 1863, when he had a chill, followed by a febrile reaction. No marked cerebral disorder supervened, however, until February 10th, when delirium was noticed at night. On the following day the patient was comatose, and at midnight of February 15th, he died, sixty-four days after injury.

*Autopsy* revealed a conoidal musket-ball wedged between the sphenoid and the left orbital plate of the frontal bone, and lying in contact with the dura mater. The orbital plate was pressed inwards and fractured, and a fissure extended

through the superciliary ridge. Over the ball, at the base of the anterior lobe of the left hemisphere, was an abscess containing two drachms of pus. The ball was incrusted by callus, and the opening it had made in entering through the walls of the right orbit was greatly diminished by osseous deposition. (Ibid., page 15.)

7. Ciniselli reports the case of a man, æt. 30 years, who was accidentally shot, the charge taking effect in the left side of the face; did not lose consciousness, in fact did not know he was hurt until he saw the blood flowing. It carried away one-half the lip, and cheek of left side from chin to forehead, nearly the entire superior maxilla of same side, of which nothing remained but the palatine plate and a portion of the alveolar arch corresponding to the three last molars and incisors; a part of the ethmoid; os unguis; internal half of orbital process of frontal and lesser wing of sphenoid; there was an extensive wound of the brain, lacerated portions of which protruded through the cranium.

After much suffering, inflammation, &c., he recovered so that at the end of three months he was able to walk out alone daily; at the end of fourth month became melancholy; loss of appetite; pain so severe in head that he wished for death, which took place at the end of the fifth month.

*Autopsy.*—Abscess in anterior lobe of brain, containing three ounces of pus, behind the left frontal protuberance. Dura mater thickened, and contained thirty grains of lead surrounded with lymph. (Archives Générales de Médecine, tom. v, 4th series, 1844, page 367.)

8. Larrey. Case of a soldier, shot at Waterloo, in whom the ball entered frontal bone, a short distance above left eyebrow, one-half the calibre being within the cavity of cranium; recovered entirely; able to resume active duty. No disturbance of intellectual faculties, except loss of memory for proper names, and a few substantives. Had paralysis of right side and heaviness of head, which was relieved by active bleeding and diluent drinks. Died of phthisis pulmonalis.

Specimen presented to Royal Academy of Medicine. (Ibid., tom. xv, 1st series, 1827, page 616.)

9. Blaquieres, of Mexico. Case of a child, where ball passed through head from one temple to the other. Lived twenty-six days after accident without experiencing any trouble, except a little in sleep.

*Autopsy.*—Anterior and superior region of the two hemispheres was found to have been traversed by a ball. The ventricles intact. The entire sinus was the seat of suppuration. The meninges were inflamed. (Ibid., tom. vi, 4th series, 1844, page 248.)

10. Dr. John Hutchinson. Case of a girl, æt. 7 years, where a buckshot penetrated the cranial cavity; probe passed in four inches. No brain symptoms. Slight vomiting. Entire recovery. Death six months afterwards from scarlet fever.

*Autopsy.*—Ball had bruised the posterior lobes of both hemispheres of cerebrum, and rebounded and remained in brain-substance. No disease of the organ. (Buffalo Medical and Surgical Journal, January, 1866.)

11. Mr. Ford. Case of a boy, æt. 15 years, who, on the 31st of January, 1845, received a gunshot wound; the ball entered the head in a line three-quarters of an inch anterior to the summit of right ear, and made its escape through the left os frontis, one inch and a quarter above the left eyebrow, fracturing the skull irregularly between both wounds in such a manner as to implicate and depress right orbit. Right orbit also had a comminuted fracture; one fracture proceeded upwards and backwards from spot where ball entered to lambdoidal suture. Insensible and stertorous breathing on admission in hospital. Right eye was closed by tumefaction; strabismus in left eye and pupil contracted. On third day able to answer in monosyllables. Fifth day delirious. Ninth day stools and urine passed involuntarily. Treatment antiphlogistic.

On 3d of April, 1845, discharged cured, perfectly well.

Senses of hearing, smell, sight and touch have not been deteriorated. Disposition not in the least altered. (London and Edinburgh Monthly Journal of Medical Science, September, 1845, page 653, vol. v.)

12. Dr. J. O. Harris, of Illinois. Case of a child who was wounded in the centre of the frontal bone, sixteen small shot having entered the brain, making a singular ragged hole in bone nearly an inch in diameter. She was comatose at the time. Several small fragments of bone were removed and wound dressed.

Three weeks after convalescent, having had no unfavorable symptoms. Still perfectly well at time of report, two years and eight months after injury. (Boston Medical and Surgical Journal, vol. lxxiv, 1866, page 53.)

13. Dr. Smith, in a course of lectures delivered in the Medical College, New York, speaks of a case where ball entered brain dividing optic nerves, yet the patient fully recovered with loss of sight only. (Boston Medical and Surgical Journal, vol. xix, 1838–9, page 291.)

14. David Rice, M.D. Case of a boy, æt. 14 years, receiving a gunshot wound of head. The ball (67 weighing one pound) entered cranium in right temple about one inch above and in front of the ear, passing through the lower part of the frontal suture and a little above its junction with sphenoid bone, and passed out at the back part of the head through the lambdoidal suture of the same side, a few lines above its apex,—the ball traversing about five inches of the substance of the brain. Remained unconscious for six days after the injury, the left side of the body completely paralyzed up to this time. From this date began to mend, and in four weeks well. Eight months afterwards still well, although he has some peculiarities that he did not have before the injury,—a slight stoop in the shoulders and his head more down than formerly, and is more inclined to mirthfulness. (Boston Medical and Surgical Journal, vol. xl, 1849, page 323.)

15. W. G. Small, M.D., Acting Assistant Surgeon U.S.A. Case of a soldier, who was wounded at second day's fight at Gettysburg. The ball struck the frontal sinus and lodged in the brain. The pulsation of the brain could be seen through wound. He fully convalesced, experiencing no trouble.

September 17th. Just seventy-one days after the injury, he complained of headache, nausea, and vomiting, &c., and died September 20th.

*Autopsy.*—Skull had been penetrated about the middle of the roof of the orbit and spiculæ of bone were driven in upon the substance of the brain. On lifting up the anterior lobe of the right side, a large quantity of pus escaped. Pus also escaped from left ventricle upon separating the hemispheres of the brain.

The whole anterior portion of the right hemisphere was in a state of disorganization, amounting almost to gangrene. Upon separating the mass, a minie ball, weighing about one ounce, fell out of the substance of the brain from posterior part of anterior lobe, near sella turcica.

Remarks.—His mental faculties remained the same up to the time of his final sickness, and a member of his regiment states that he knew of no difference in his mental condition previous and subsequent to the receipt of his wound. (Medical and Surgical Reporter, October 3d, 1863, page 307.)

16. Prof. J. L. Cabell, of the University of Virginia, mentions a case of a man, æt. 30 years, who received a gunshot wound in left side of head, in front of and on a level with parietal protuberance; ball entering brain, and substance of that organ escaping. Unconscious for five days. Paralysis of right side. His brother removed piece of bone day after injury. Three months later ball removed and another fragment, and at intervals smaller pieces.

Recovery, with a gradually improving hemiplegia. (Medical and Surgical Reporter, January 27th, 1866, page 68. Extracted from Virginia Medical Journal.)

17. In the village of Rheindorf, in Rhenish Prussia, has

recently died, at the age of 75, a veteran of the French war, who, at the battle of Austerlitz, December 2d, 1805, was struck by a Russian ball, which buried itself in the left temple, above the rim of the ear, and remained there until his death—a period of fifty years—without ever causing any inconvenience or producing any change in his intellectual faculties.

*Autopsy*, by Dr. Backe, of Bonne, who performed this operation, with the assistance of a trephine, in such a manner that the ball remained surrounded by a ring formed by the bones of the skull. The ball on side where it touched the brain was covered with a dense membrane, and upon the other with an investment similar to that elsewhere covering the head.

The brain itself was uninjured, and no splintering of the bones of the skull was discovered, either in neighborhood or elsewhere. (Virginia Medical Journal, vol. vi, 1856, page 184. Extracted from Journal de Médecine, May, 1855.)

18. H. C. May, M.D., Acting Assistant Surgeon, U.S.A. Case of a private of First Missouri Artillery, æt. 34 years, who was shot at siege of Vicksburg, May 19th, 1863. While sighting a cannon, a charge of cannister was fired into a group working the Federal piece, killing three of his comrades and wounding himself.

The concussion knocked him down, but he soon recovered himself, and walked to the hospital, covered with blood, which flowed freely from a wound in the head. He was at once probed by several surgeons, who all said they readily defined the outlines and flattened surface of a large leaden bullet in the substance of brain.

The missile had entered the cranium at a point immediately posterior to coronal suture on left side and about three inches from mesian line or sagittal suture. It passed horizontally inwards a distance of two and a half inches, as judged by sensations of patient in having wound probed at time of injury, and his recollection of the statement of the surgeon who had him in charge.

He remained about the hospital nine weeks, when he returned to battery, until September 3d, 1863, when he was discharged from service. Nine months afterwards still living and well. Has had an attack of camp fever since the accident. (American Medical Times, vol. viii, April 16th, 1864, page 185.)

19. Bagieu. Case where a ball entered right nasal orifice, making its exit at the top of the head, with serious and extensive lesion of the brain; abundant suppuration, with a considerable loss of brain-substance; a number of spiculæ were removed, fungus formed, and there supervened many dangerous symptoms, which, however, were followed by a happy cure. (Mémoires de l'Acad. Royale de Médecine, tom. x, page 125.)

20. Quesnay mentions a case where a ball remained one year in the brain without producing any serious accident. It was found after the death of the patient, which was from another cause, imbedded two fingers' breadth in the brain. (Ibid., p. 126. Mémoires de l'Acad. Royale de Chirurgie, partie ii, tom. i, page 131.)

21. M. de la Martiniere presented to the Academy a grenadier, who had received a ball through the frontal bone, ball remaining in brain; out of danger on twenty-seventh day, and when presented, had only a small fistula and no accidents of any kind which appear to depend on presence of the ball. (Mémoires de l'Acad. Royale de Chirurgie, 1765, tom. i, partie ii, page 132.)

22. John Kirby. Case of a young man wounded at the battle of Waterloo, within whose head a musket-ball had lodged. The external wound had healed. He seemed to enjoy very good health and made no other complaint, than that he was subject to giddiness whenever he took violent exercise, or his mind dwelt on any particular subject. (Remarques sur le Plaies du Cerveau, par M. Quesnay, Mém.

de l'Académie Royale de Chirurgie, tom. i, 2d edit., p. 310. Dublin Hospital Reports, vol. ii, page 308.)

23. John Kirby. Case of a man, in which a portion of a bullet, &c., lay in the substance of the brain for several months without the mental or physical powers of patient being injured. Death from it eventually seven months after accident.

*Autopsy.*—Abscess in left hemisphere of brain; contained something more than one ounce of pus, and a large portion of a ragged bullet. (Dublin Hospital Reports, vol. ii, page 303.)

24. Preussius mentions a case where a ball entered the brain through the upper nasal passages, without causing death of the patient.

25. Fabricius de Hildan gives an account of a ball which pierced the frontal bone and was lost in brain. Patient convalesced happily; died six months afterwards of an acute disease, when ball was found towards sagittal suture, between cranium and dura mater, without the latter being injured.

26. Case of a Hessian grenadier, æt. 40 years, who received a ball (grapeshot) on that part of the os frontis which forms the external canthus of the eye. The ball making its passage through the head, came out under or rather behind the opposite ear. He appeared to have a perfect recollection of every circumstance that had occurred to him, except only for a short time after he fell. Recovery. (The Medical and Chirurgical Review, vol. ii, page 186, 1796.)

27. Heister reports a case of a Hessian soldier, under the care of Dr. Möller, Professor of Physic at Giesen, who had received a shot, the ball entering under the right eye, passing obliquely upwards through cerebrum and cranium above the right ear, lodging at its exit between the cranium and scalp. Recovery in ten weeks. (Heister, in his Medico-

Chirurgical and Anatomical Cases and Observations, page 7, Observation 7. George Wirgman's translation from German.)

28. Dr. Campbell Taylor. Case of a man wounded at Inkermann, November 27, 1854, and received into Scutari Hospital. The ball struck his head over left parietal bone, close to sagittal suture, and split; one-half appeared to have entered cranium, while the other passed between scalp and cranium to occiput, where it was extracted. Patient was insensible for two days after receipt of injury, and hemiplegic on the right side; mental faculties unimpaired.

February 24, 1855. Patient has now perfect use of his right arm, but the right leg is still weak; he cannot put it firmly on the ground, and he drags it after him in walking. Wound healed. Invalided to England. (Edinburgh Medical Journal, vol. i, part ii, page 1126.)

29. Hennen. Case of a soldier in the service of Bonaparte. Was wounded on 18th of June, 1815; came under his care 4th of July, at Gens d'armerie Hospital. A musket-ball had entered at the anterior portion of the squamous suture of right temporal bone, and passing backwards and downwards fractured in its course the parietal bone, and lodged itself in the substance of the brain. On the 5th of July, seventeen days after the accident, the wound was laid open, when three large and several small pieces of bone were removed, and the ball, which was found lodged in the posterior lobe of the right hemisphere of the brain, where it rests on the tentorium, was extracted without difficulty, and with small portions of the substance of the brain adhering to it.

On 5th of August, wound was cicatrized, the pulsation of the brain was still visible, but with the exception of a slight degree of giddiness on stooping he enjoyed perfect health. (Hennen's Military Surgery, 1829, 3d ed., page 292.)

30. Farre, a chasseur of the Imperial Guard of Napoleon, who had fought at Borodino, distinguished himself most

gallantly on the field of Waterloo. No mounted British soldier was enabled to unhorse him on that day; but he at length fell, amid a shower of musket-balls, one of which penetrated his left temple, at the junction of the three sutures. Insensible three days and nights. The entrance of the ball, and its course within the brain, were very evident to the eye and probe.

In October, four months after the battle, this man was alive, and without any constitutional injury, or disturbance of any one function, was performing the part of an assistant and orderly to his less fortunate comrades. In expressing himself, he said, so little inconvenience did he feel, that could it benefit the Emperor, he would willingly receive a bullet on the other side. (Ibid., page 296, Case XLII.)

31. A soldier, wounded at the battle of Quatre Bras, June 16, 1815, on posterior part of occipital bone. He could not tell by what weapon, nor did he immediately perceive the accident; it was only after retiring about one hundred paces, that, on the information of his comrade, he discovered that he was at all injured.

Ball removed 7th of July, with pieces of bone.

On 29th July, forty-three days after injury, attacked with intermittent fever; he proceeded carefully towards a convalescence, until, sixty-three days from accident and forty-four from operation, a fungus of cerebrum occurred, gradually increased until 23d August, ninety-eight days from the injury, when he died in convulsions.

*Autopsy.*—Thickening and inflammation of dura mater, and an extensive attachment had taken place between that membrane and the cerebellum. The fungus was formed of the inferior and back part of the cerebrum.

Pus in pleural cavity; abscess in upper part of right lung. (Ibid., page 298, Case XLIII.)

32. During the war with the United States, in 1814, a soldier in Canada was struck by a ball which lodged in the posterior part of the side of the head; the wound healed,

and the man returned to his duty. Twelve months afterwards, having got drunk, he fell down in the streets of Montreal, and died.

*Autopsy.*—The ball was found in the corpus callosum, where it had made a small hole or sac for itself. (Guthrie on Injuries of the Head Affecting the Brain, 1842, page 2.)

33. Guthrie. Case at the battle of Toulouse, April 10th, 1814, of a man æt. 25 years, who had a piece of occipital bone driven in by a ball, which, striking directly upon it, made a hole no larger than the end of the finger. The part injured was so exactly the size of the ball, and the bone was so clearly to be felt deep in the posterior lobe of the brain, whilst the ball had probably gone beyond it, that he thought it right to recommend the man to have the bone removed.

He declined, but begged to have more to eat; which was in turn refused.

He had no bad symptoms, and the wound closed in. Recovery was perfect.

The man was sent to Colchester, where he one day got drunk, and also fell down dead in the market-place.

*Autopsy.*—The ball was lodged deeply in the posterior lobe of the brain, in a sort of cyst.

Observation.—"It was the recollection of the above and other cases which induced me, after the battle of Waterloo, to recommend, in that of a soldier similarly wounded, that nothing should be done unless symptoms arose demanding the use of the trephine." (Ibid., pp. 2, 3.)

34. William Rogers, æt. 19 years, of the thirty-second regiment, was wounded on the 16th of June by a musket-ball, which entered at the inferior angle of the left parietal bone; it knocked him down, and for a few minutes rendered him senseless. On recovering his mental powers, which he soon did, he found that he was unable to speak, not so much (as he says himself) from the want of power to form words as from the incapacity of giving them sound. He was con-

scious of everything passing around him and reasoned correctly.

June 18th. Admitted into Minime General Hospital.

19th. On examining the wound the ball was found to have passed obliquely upward and backward, at least two inches, and could be distinctly felt with a probe. The defect in speech was in some measure restored, and this with giddiness were the only symptoms of compression.

Everything went on well, the wound was nearly healed, and he was considered almost fit to be discharged, when, on July 16th, the wound began to open.

On the 18th it was dilated and a portion of the cranium removed by the forceps, which was soon followed by inflammation of the brain, and twenty ounces of blood were taken from the arm; purgatives and diaphoretics were ordered and the strictest abstinence enjoined. Under this treatment he improved rapidly.

August 3d. Doing remarkably well; the wound healthy; the pulsation of the brain evident; the power of speech perfectly restored.

The ball yet remains in, according to the opinion of the patient (who is a fine, intelligent lad), and he thinks has gradually descended towards the petrous portion of the left temporal bone. Sent to England at the end of the month, well. (Ibid., page 105.)

35. Ramdohr gives the case of a hussar, wounded above the left eye, at the corner of the frontal sinus, by a musket-ball, which penetrated the brain. He got quite well, and remained so for four months, when he became stupefied, had convulsions, and died.

*Autopsy.*—The ball was found a quarter of an inch above the left ventricle. (Ibid., page 132. Lane's edition of Cooper's Dictionary, page 901. Extracted from Schmucker (J. Leberecht), Vermischte Schriften, 2d ed., Berlin, 1785, Bd. i, page 227.)

36. Hildanus relates the case of one Clerget, who received

a wound from a musket-ball, in the attack of the camp of La Cluse, in the forehead, with a great fracture of the bone. Carried, half dead, to Geneva, and carefully treated. The wound healed, and he lived six months in health, dying shortly afterwards of an acute disease.

The head was opened, and the ball found near the vertex, lying between the bone and the dura mater, which was uninjured. (Guthrie on Injuries of Head, &c., page 133. Extracted from Hildanus, Centuria ii, Observat. ii, page 77.)

37. Anel speaks of a ball which had lodged on the pineal gland for several years, the sufferer having died suddenly. The ball was found covered with blood, lately extravasated, which had probably caused his death. (Guthrie on Injuries of Head, &c., page 132. Académie de Chirurgie, tom. i, page 236. Extracted from the Bibliotheca Chirurg. of Mangetus.)

38. Marechal mentions a case in which a ball entered the brain through frontal sinus, and was found a year afterwards lodged in the brain by the side of the sella turcica. (H. F. Ledran's Consultations, &c., Paris, 1765, page 126. Reid's translation of Ledran, 1766, London, page 138.)

39. Ledran records, from M. Bailleron, sworn surgeon of Beziers, who attended, with his colleague, M. Amillace, a woman, æt. 26 years, who was shot February 17, 1721.

"There were two openings made by one shot; neither could I discover, upon the strictest examination, the place of the ball's entrance from that of its exit, though the latter ought to have been the largest. The reason that occurred to me was, that a part of the extraneous body having remained in the cranium, the other part was not sufficiently large to make me distinguish one from the other, which is common in gunshot wounds. Wound was situated in the inferior part of the right parietal bone between the temporal and right ear. Some depressed bone was raised, and wound was healed 15th of May.

"Recovery perfect, except a slight heaviness, which has left in last two years." (F. S. Surgeon's translation of Ledran's Observations in Surgery, 1739, page 83.)

40. In July, 1830, a Swiss soldier was brought into Hôtel Dieu, wounded by a ball, which had split in two pieces, one of which penetrated the brain, and, traversing posterior lobe, had lodged upon tentorium. Recovery. (Dupuytren, Clinicale Chirurgie, tom. ii, page 444.)

41. Larrey speaks of a case of a ball which had penetrated the os frontis, entering brain, situated on top and anterior of right lobe of brain. Extracted, followed by recovery. (Larrey, Surgical Memoirs of the Campaigns of Russia, Germany, and France; Mercer's translation, page 113.)

42. Case of a soldier during first revolt at Cairo, who was wounded by a musket-ball, which pierced the frontal bone, near longitudinal sinus, without injuring dura mater, and passing back and between it and bone as far as occipital suture.

The course was discovered by gum-elastic sound, and applying a trephine over the part by measurement, it was extracted, with the evacuation of some pus, which was depressing dura mater and brain. Recovery. (Ibid., page 306. Larrey's Clinique Chirurgicale, tom. i, page 216.)

43. A man wounded at Elchingen, 22d May, 1809, ball penetrating left temple, near orbit. Lost all his senses and almost all his animal faculties. Ball removed in August, after which he talked like a child just beginning to stammer.

November 1st. Recovery was expected.

December 1st. Fell a victim to hospital fever. (Larrey's Memoirs of the Campaigns in Austria; R. Wilmot Hall's translation, page 318.)

44. Case of a man shot at battle of Witspsk. The ball

struck frontal region a little above the right eyebrow. The ball afterwards had pierced and fractured the os frontis, and penetrated into the interior of the cranium, where it lodged against the apex of the right anterior lobe of brain, against the orbital projection of the os frontis and internal crista of same bone. The ball (weighing 7 French ounces) was removed, followed by recovery. (Larrey, Clinique Chirurgicale, tome i, page 22. Dr. Rivinus's translation of Larrey's Memoirs on Wounds, &c., 1832, page 148.)

45. E. D. Cone, M.D., reports a case of a man, æt. 30 years, who was shot; ball (size of a buckshot) entering between the lids at inner canthus of the left eye. He lived $3\frac{1}{2}$ months, when death took place from inflammation of the brain.

*Autopsy.*—Brain congested; anterior lobes softened, underneath which, and resting on os ethmoides, was found the ball, much flattened, with several fragments of bone. (Eve's Surgical Cases, page 50; extracted from Peninsular Journal of Medicine, 1854.)

46. Langlet gives a case where a seven-drachm ball remained for eighteen months in brain; a fact the more curious that a sort of membranous envelop connected with the dura mater was thrown around it. By this singular disposition the ball was in some measure suspended in the purulent matter which surrounded it. (Ibid., page 55; extracted from Bulletin de la Faculté de Médecine, No. 10, for 1812.)

47. A boy, æt. 16 years, shot himself. Two balls penetrated the anterior part of the brain by the same opening, and made such destruction as to bring away a quantity of cerebral matter equal to two cupfuls of the ordinary size, and to permit the introduction of a gum elastic probe to the depth of four inches without meeting any obstacle.

The patient was unconscious of anything that passed for twenty-four hours, when he revived; was able to move himself, and sensible of what passed, but had lost his sight.

The wound healed readily, a large quantity of cerebral matter coming away at each dressing. On the twenty-seventh day wound entirely healed, although neither of the balls had been extracted. (Ibid., page 53; extracted from Bulletin de la Société de Médecine de Gand; Southern Medical and Surgical Journal, 1837.)

48. O. S. Gibbs, M.D., of Ohio, reports a case of a man shot in head by a rifle-ball, the ball entering about midway of a line drawn from the angle of the eye to the top of the ear. He was partially insensible.

The probe would pass in the track of the ball in a horizontal direction full $2\frac{1}{2}$ inches. With the exception of some slight mental impairment and partial hemiplegia, the recovery was complete. It was supposed the ball was lodged in the brain at the base of the cranium; but, from its point of entrance and its horizontal direction, the conclusion was hardly avoidable that it lay in cerebral substance. (Ibid., page 53; extracted from Medical Counsellor, 1855.)

49. Paroisse relates a case of a man where a ball remained in cavity of cranium, and at end of six months felt no inconvenience except a difficulty of opening the mouth. (Lane's edition of Cooper's Surgical Dictionary, vol. i, page 901; extracted from Opuscules de Chirurgie, obs. i, tom. viii. Paris, 1806.)

50. Thompson speaks of a case where a ball, entering behind right temple, and, passing backwards and downwards, had fractured the bones in its passage, and lodged on the surface of the brain over the tentorium, from which place it was extracted on the seventeenth day after injury. No bad symptom had manifested itself previously to the operation, and the man recovered, under the strictest antiphlogistic regimen, with little or no constitutional derangement. (Ibid., page 898; extracted from Thompson's Observations made in the Military Hospitals of Belgium.)

51. M. Velpeau cites a case where several small shot lodged for many years in dura mater and was the cause of epileptic fits. (De l'Opér. du Trepan. Velpeau.)

52. Jules Gustin, æt. 21 years, was admitted into Hôtel Dieu on the 19th of February, 1857. Was struck by a ball in forehead, in front of Malakoff tower, April 8th, 1855, the projectile, prior to penetrating the cranium, having come in contact with the external surface of the visor, leaving a semilunar depression as it passed over the edge of this. He immediately fell, and remained insensible for twenty-four hours. He remained in the military hospital at Constantinople four months, then requested permission to return to the army, and did so in spite of the suppuration, which had never ceased. He fought at Traktir, August 16th, 1855, and returned to Paris in December. He remained six months longer in the regiment, although unfitted for active service.

The symptoms continued much the same from the first, and consisted in a sensation of heaviness of the head, an uncertainty in the attitudes, and a feeling when stooping as if the forehead was separating from the head; suppuration always persisting.

On his admission into the Hôtel Dieu, a clean, circular aperture, about the size of a franc, was observed in the centre of the forehead. Passing the finger around the circumference of the opening, "osseous granulations, partial ossifications formed by the periosteum," could be felt, and on the introduction of a probe to the bottom, a hard, resisting metallic body was recognized.

After a crucial incision had been made, the aperture caused by the ball being found too small to admit of its extraction, a circle of bone was removed by means of the trephine. The ball was now extracted, and some hard, blackish blood-clots removed.

The movements of elevation and depression of the dura mater isochronous with the pulse, were plainly perceptible. The projectile proved to be a leaden ball weighing 25 grammes (375 grs.). Its surface was smooth and spherical

over only a small portion of its extent, the remainder being rough and irregular. Recovery was complete, the man having been in perfect health as late as October, 1860. (British and Foreign Medico-Chirurgical Review, vol. xxvii, 1861, page 541. Extracted from Comptes Rendus, 1861, No. 6, by M. Jobert.)

53. Griffon. Case of ball penetrating brain. Death after six months. (Bruns. Die Chirurgischen Krankheiten, page 848. Extracted from Fabriz Chirurgische Beobachtungen, from Latin of Von Weiz. Zweites Hundert, Bd. xi, page 188.)

54. Morand. Case of ball penetrating brain. Death 9½ months after injury, from abscess of brain. (Ibid., page 848. Extracted from Opuscules de Chirurgie. Paris, 1768. Partie i, page 159.)

55. Ziegler. Case of gunshot wound of forehead; ball entering brain. Patient recovered entirely, and only after 1½ years, symptoms of cerebral disease set up, with loss of power, followed by a violent epileptic seizure and sudden death.

*Autopsy.*—Entire right anterior lobe connected with an abscess. (Ibid., page 848. Extracted from Ziegler's Dissertatione. Tübingen, 1843, page 21.)

56. Volaire. Case of a ball remaining in brain. Death in 2½ years. (Ibid., page 848. Extracted from Journal de Médecine, Chirurgie, Pharmacie, etc. Paris, 1764, tom. xx, page 553.)

57. Hanke. Case of a ball remaining in brain. Death after 6 years, in consequence of increasing symptoms from remaining ball. (Ibid., page 848. Extracted from Rust's Magazin, 1846, Bd. lxv, page 98.)

58. Arcæus. Case of ball remaining in brain. Death

after ten years. (Ibid., page 848, cited by Paroisse, Opuscules de Chirurgie, Paris, 1806, page 6.)

59. Wiebe. Case of a musket-ball penetrating forehead, in 1813. Perfect health from 1814 to 1816; then solitary epileptic attacks 1819. Almost sudden death.

Pieces of lead found between cranium and dura mater, with extensive suppuration under frontal bone. (Ibid., page 849. Extracted from Medicinische Zeitung des Vereins für Heilkunde in Prussen, 1836, page 246.)

60. Nobele. Case of an attempt at suicide, pistol containing two balls, which penetrated three lines to right of mesian line of frontal bone, with considerable loss of brain substance. Sound penetrated four inches obliquely to left, without finding the ball; enlargement of opening by trephining, and on thirty-seventh day wound was fully cicatrized, and, with the exception of loss of sight, in perfect health, and patient perfectly bright. After fifth month occasional convulsions, and death after second year. No autopsy. (Ibid., page 849. Extracted from Annales de Médecine Belge, 1835, and Schmidt's Jahrbücher, Bd. ix, page 321.)

61. Ruppius. At the battle of Leipsic a ball penetrated the middle of parietal bone, about half inch from the edge of the sagittal suture. Six days after he was sent, with the slightly wounded, to Altenburg, where he recovered very rapidly, and so fully that he abandoned himself to all the pleasures of life.

At an examination, made six weeks afterwards, of the still suppurating wound, the sound not only penetrated to the ball, but moved laterally so much that it was decided that the entire right hemisphere had suppurated. A short time after the wounded man travelled to Silesia, in perfect health, except with a slight suppuration of the wound.

This is probably the same man whose death was reported to have suddenly taken place in Glogau, in 1820, and in whose post-mortem examination it was found that half of

the brain was absent. (Ibid., page 849. Extracted from Zeitschrift für die Gesammte Medicin, Hamburg, 1836, Bd. ii, page 93.)

62. Bax. In 1830; case of gunshot wound of head at the left end of the lambdoidal suture, above the curve of the lateral sinus. Rapid convalescence.

November 11th, 1837. Death after four days' illness of cerebral attacks.

*Autopsy.*—Ball was found at point indicated, with more than its half within cranial cavity, surrounded by an abscess in brain substance, which reached nearly to ventricle, besides softening of the left hemisphere almost to fluidity. (Ibid., page 849. Extracted from Recueil des Travaux de la Société Royale de Médecine de Bordeaux, 1838, and Fricke, Zeitschrift, Hamburg, Bd. viii, page 455.)

63. Malle. Case of an officer who received a gunshot wound of head. Recovered thoroughly, and reached a happy old age. After his death, which was not produced by any brain affection, ball was found in left lobe of cerebellum. (Ibid., page 850. Extracted from Clinique Chirurgicale, Paris, 1838, page 162.)

64. Case of an officer who received a pistol-shot wound in mastoid process. Recovered thoroughly, and was killed, several years afterwards, by a shot in breast.

*Autopsy.*—First ball was found impacted in the mastoid process, two-thirds of its calibre projecting into cavity of cranium. (Ibid., page 850. Extracted from Clinique Chirurgicale, Paris, 1838, page 163.)

65. Hartmann. Death of a man æt. 109 years, who, at the battle of Malplaquet (on authority of the then field surgeon), received a ball above the right eye, remaining between cranium and dura mater. (Ibid., page 850. Extracted from Göttingen Gelehrte Anzeigen, 1769, page 202.)

66. Conradi. Case where one grain of shot entered brain through frontal bone. Three years after man alive and well. (Ibid., p. 851. Extracted from Halleri, Disputationes Chirurgicæ Selectæ, tom. i, No. 5.)

67. Heidenreich. Case of a man who received a charge of shot from a pistol, fired at short range, one shot penetrating right eyelid and another half way between eye and ear, one inch above the meatus, in right temple. The probe entered brain to the depth of three and a half to three and three-fourth inches, whereupon the patient fainted.

No cerebral attacks. Perfectly well January 31st. Still well the following July. (Ibid., 851. Extracted from Medicinisches Correspondenzblatt Bayerischer Aerzte, 1847, page 457.)

68. Mühry. Case of a ball entering brain one inch above right eyebrow, close to mesian line. Sound passed in a horizontal direction two and a half inches, where it impinged upon a solid body. Disturbance of the functions of brain; psychical symptoms were present.

One year after, fistula closed to half inch, and brain resuming its normal condition. (Ibid., page 851–2. Extracted from Hannoversche Annalen, Neue Folge, 1845, Bd. v, page 64.)

69. Viord. A man with a pistol-shot wound in right temple, four centimeters from outer canthus of eye, and on the same level; eyeball pressed forward, and could make all the movements except rotation outwards. Pupils dilated and immovable; sight considerably diminished. Rest of his senses and motion uninjured.

Sound passed five centimeters or nearly two inches without meeting any obstruction.

Diagnosis made, was that the ball entered cranium near fissure of Sylvius, passed on through this fissure to region of anterior clinoid processes of same side. No disturbance of olfactory function, but it wounded the abducentes, oph-

thalmic ganglion, motores oculorum, pathetic and optic nerves; complete paralysis of the two former, and incomplete of the two latter.

No bad symptoms. Patient went travelling twelfth day after injury; six weeks, complete cure, with almost restoration of function of right eye. (Ibid., page 852. Extracted from Gazette des Hôpitaux de Paris, 1853, page 192.)

70. Case of a soldier who was struck at Magenta by a ball, which passed through his shako, penetrated the vertex near the sagittal suture, and occasioned paralysis and cerebral symptoms, which gradually disappeared. The man was admitted into invalid depôt at Prague, where he performed the duties of a cook, and cut and carried wood. At this time there was a fistulous opening at the vertex, which occasionally discharged a small quantity of pus. At the expiration of three years, he accidentally discovered a rough and somewhat movable body at the opening, which was removed by a comrade with a pair of teeth forceps, and proved to be a minie ball, which must have carried with it into the brain some of the felt of the shako, since the fistule was remaining open in 1862. (Handbuch der Kriegschirurgie, von J. Neudörfer, M.D. Review of, by Dr. S. W. Gross, American Journal of the Medical Sciences, October, 1867, page 431.)

71. A case where a piece of a ball made its exit by the fistulous orifice on the one hundred and twenty-fifth day. In this instance there was also complete hemiplegia, which had, however, so far disappeared at the end of ten months, when the man left the hospital, that there was merely a weakness of the affected half of the body.

The fistula remained open, a fact which rendered the presence of other foreign substances highly probable. There could be no doubt that the ball was imbedded in the brain, as the skull and membranes were opened to the extent of two and a half square inches, through which the fistula

could be seen to be seated in the exposed brain. (Ibid., page 431.)

72. Prof. S. D. Gross relates a case of a ball, an ounce one, entering the upper and back part of the skull, making an opening capable of receiving the index finger, and penetrating the brain, as was found by the fact that some of it had escaped at the wound. Where the ball lodged could not be ascertained.

Rapid and complete recovery followed, without a solitary untoward symptom. (Gross, System of Surgery, vol. ii, page 241.)

In calling attention to the case which came under my own observation, I do not wish it understood that I consider her entirely free from danger. Indeed, the purport of the report of cases tends to show that in the majority of instances, although the patient recovered from the immediate effects of the injury, and lived for some time afterwards enjoying good health, and in full possession of all the faculties, yet death ultimately ensued from some trouble arising from the presence of the foreign body.

In forming our prognosis of such cases, we labor under some disadvantage, as often it is utterly impossible to determine with certainty the exact position of the ball; it may have become lodged at its entrance, in the bones of the skull, or between the skull and dura mater, or possibly traversing the brain completely, lodging at its exit from the bones of the opposite side, between them and scalp.

Certain parts of the brain are no doubt less susceptible to sad results, arising from loss of substance, or impaction of foreign bodies.

Guthrie* remarks: "I have never seen a person live with a foreign body lodged in the anterior lobe of the brain, although I have seen several recover with the loss of a portion of the brain at this part; my experience then leads me to

* Guthrie, Injuries of Head.

believe, that an injury of apparently equal extent is more dangerous on the forehead than on the side or middle of the head, and much less so on the back part than on the side."

There is a great discrepancy of opinion as regards the treatment of such cases.

Brodie* constructed a table, which represented in every case the kind of wound, the treatment employed by the surgeon as far as operations were concerned, and the results which followed, and he remarks: "That it was curious to observe how large a proportion of the recoveries occurred in those cases in which the surgeon either avoided an operation altogether, or confined himself to the removal of some loose and detached pieces of bone. You may well suppose that a person who had a musket-ball lodged in the brain is in a very serious condition; nevertheless, it appears that it is safer to allow it to remain, than to endeavor to extract it."

In my estimation the proper plan of treatment to be pursued, and that adopted by most surgeons is, that if the whereabouts of the ball can be ascertained, and if it can be extracted with but little disturbance of the brain-substance, it should be removed, and the sooner the better, and under no other circumstances should it be interfered with, as it is far better to allow the foreign body to remain, than to search or attempt to extract it at the risk of additional injury.

* Sir B. Brodie's Lectures.

# A CONTRIBUTION

TO

# THE HISTORY OF TOXÆMIA.

By WILLIAM HUNT, M.D.,

ONE OF THE SURGEONS OF THE HOSPITAL.

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The egotism of this article must be excused, as I cannot think how to describe the facts stated in it other than in the first person.

Three times within the last ten years, I have been poisoned and made seriously sick by effluvia or noxious emanations from the human body. The train of symptoms were so exactly alike in the different attacks that I am sure there can be no mistake as to the cause; and as I do not remember to have read of similar cases, it may be well to record mine here, as a contribution to the history of blood poisoning, and as an illustration of the hazards of hospital and professional life. I do not mean to say that there is anything particularly new in the kind of affection about which I am going to write; on the contrary, I believe many a one exposed to the cause has been struck down by similar attacks, and that the sickness has been called typhoid or typhus, or by some analogous name which may have been very proper, without a recognition of the direct cause. The value of this paper lies in the definite character I am able to give to the descriptions as to cause, time, place, and symptoms.

It may be well to state that for fifteen years I have been

actively engaged in hospital life. During seven of those years I was also demonstrator of anatomy in the University of Pennsylvania, where a large number of bodies are annually dissected. If acclimatization therefore amounts to anything, I ought to be considered as protected. Again, as an idiosyncrasy, I may mention that while remarkably sensitive to the effects of poisonous plants, such as the varieties of *Rhus*, I have never yet had so much as an angry pustule arising from various scratches, punctures, and abrasions received from instruments and bony spiculæ, whilst making dissections or performing operations.

The causes and times of the attacks will be given. The subsequent phenomena were so nearly alike that one general description will serve for all.

*First.* This occurred in the winter of 1860, and was from a dead body. A subject, apparently sound in every other respect, had a tympanitic abdomen. I stood directly over it, and made one sweeping cut through the belly. At once there was a gush of most peculiarly-offensive gas, which nearly overcame me, but from the effects of which, as I thought, I soon recovered, and went on with my work. I was mistaken, however, for within twenty-four hours I was taken sick, and was utterly unfit for duty for six weeks. It will be interesting to state here, that Professor Leidy used the same subject, a day or two afterwards, for a class demonstration, and both he and his assistant were taken sick, and though they were not affected to the same degree that I was, they were handled somewhat in the same manner.

*Second.* The time was in the latter part of 1865. A man was admitted into the Hospital with very extensive abscesses of the gluteal regions of both sides. He had been sick for some time, and was greatly broken down from pain and loss of sleep. Fluctuation and emphysema were present in both nates. I called for a knife, and without considering my exposure, I made a deep plunge and laid open one side. There was a tremendous gush of extremely offensive gas and pus,

and as I was standing immediately over it, I inhaled in full force, the foul air of the noxious material.

Although it was cold weather, all the windows of the ward had to be opened, and I doubt whether there was a person in the room who was not temporarily sickened. As in the first case, the immediate effects rapidly passed off and the circumstances were for a short time forgotten.

This was on a Friday. On the Saturday following I gave a clinical lecture, and afterwards visited a patient in the western part of the city. On coming out of her house, I was attacked with rigors, and was obliged to go home, and did not leave the house for four weeks.

*Third.* This was in the summer of 1867. A gentleman of 70 years of age, had a very bad cancer affecting the whole of his lower lip and involving the glands of the neck. The odor, both of the breath and of the ulcer, offensive at all times, was especially so when the old dressings were removed. I had been attending this patient for some time, and to show that there was nothing of a sentiment of repugnance or disgust in my relations towards him, I must state, that I had frequently expressed to his son (a prominent surgeon and intimate friend), the satisfaction it gave me to dress him and administer to his comfort, as he bore his sufferings with such great patience and true Christian resignation. I may say, that I was never in better health than at this time, but on one unfortunate morning, I sat myself before my patient, and coincident with my lifting off the dressings, which had been on since the previous evening, he gave a hard but involuntary cough directly into my face. I thus inhaled the full effects of the accumulated discharges and fetid breath, which, as it were, were forcibly injected into my respiratory passages. I felt sickened at once, but as in the other cases, the first impression soon went off. Twenty-four hours afterwards I was attacked as before, but so unwilling was I to believe in the supposed cause, that I made an effort to visit my patient and again to dress him. I got as far as the threshold of his room, when, meeting with the

odor, it was utterly impossible for me to enter, and if I had not found support I must have fallen to the floor. I soon went home, and was laid up for about three weeks. Since my recovery I have been able to visit this patient with perfect indifference, although I take care not to come in the way of any forced exhalation from him.

*Symptoms.*—These were different only in degree. The third attack was milder than the other two, which were about equal in severity. There was a positive chill in the first case, followed with a high fever and delirium. In the other cases there were rigors followed by fever, with but little if any mental disturbance. Coincident with these phenomena, severe pains in the limbs, back, and head, sat in. The pain was greatest in the calves and in the head, and there was a general sense of soreness and stiffness in all parts of the body. The pulse rose to 90 or 100. The tongue retained its moisture and was coated with a whitish or yellowish fur. The moisture, however, was of a very unpleasant character, as it was quite viscid and caused a constant clammy or sticky sensation, which was not changed by any ordinary diluent. Thirst was not a prominent symptom. The breath was heavy and sometimes even fetid. (It will be understood, of course, that I derive these facts both from my kind medical attendants, as well as from my own observations.) The bowels were constipated, and when moved, the dejections were extremely offensive. There was much flatus, though never enough to make more than moderate tympany. The urine was scanty. It was not critically examined. In all the cases there was more or less cough, and a peculiar labored and sighing respiration. The lungs, in fact, were the organs that seemed to be the chief seat of local trouble. There was no rusty expectoration, but it was viscid and scanty. Percussion was dull over the lower lobes, and there were subcrepitant and sibilant râles.

The most prominent and peculiar symptom in all the attacks was *utter anorexia.* Such a complete loathing of food in all forms I think is rarely experienced, and this without any absolute nausea. As the other acute symptoms subsided

this remained, and, in fact, its subsidence was the sign of convalescence. The simplest things, and the most tempting morsels, were alike refused, and nothing but coaxing and appeals to duty and reason would induce me to take even a modicum of nourishment.

This condition lasted for about two weeks in the first two attacks, but not so long in the last. There was much mental irritability, particularly on the presentation of food. Wakefulness was also a distressing symptom. There were no glandular swellings manifest externally. The pains and fever subsided in a few days in all the attacks, but they were replaced by a relaxed and very unpleasant condition of skin, which was moist and cold, especially about the knees and the back, and particularly so at night. This change was accompanied by no immediate alteration in the cough, the insomnia, or the anorexia. As a matter of course, there was loss of flesh, amounting, as I tested, to eight or ten pounds in the last attack, which was by far the mildest one.

Convalescence was marked by the ability to *enjoy* food and acid drinks, although it was by no means rapid. For weeks after I was, to all appearances, well, there was shortness of breath and a peculiar sighing respiration, which was aggravated by any exertion, particularly by efforts at reading aloud or continuous talking. These symptoms gradually subsided, and in from ten to twelve weeks after exposure I may be said to have recovered my usual good health.

*Nature.*—I think, from what has been stated, that there will be no difficulty in placing this affection among the varieties of toxæmia. Neither would it be anything strange to maintain that specific poisons emanate from organic bodies in various stages of decomposition and disease.

What are the characters of these poisonous substances? It would seem that concentrated forms of them were necessary to produce the troubles with which I suffered, for it will be remembered that at every exposure I seemed to have them fairly injected into my respiratory organs. We are constantly exposed to ordinary noxious emanations, without

any very great risk, or without experiencing any very evil effects; therefore is it unreasonable to suppose that when confined mephitic material is suddenly allowed to escape, that one of its invisible constituents should be a specific deleterious substance, capable of acting, if it found a nidus, but otherwise soon destroyed or diluted, so as to become comparatively harmless? We may imagine a microphotograph taken of the material just as it gushes forth, picturing myriads of spores rising to a certain height and then falling dead, like melting snow-flakes. The hapless victim who chances to be in the first part of the stream, catches up the living material, and affords a bed for its nourishment and propagation. Who knows but what we may, some day, see such a photograph? Stranger things have happened.

*Diagnosis.*—The history will be the great guide. At first the attack seems like one of ordinary influenza, but the absence of coryza and the persistent anorexia will serve to distinguish it.

From an attack of enteric fever it is also easily distinguished. The invasion is too sudden and violent, and there is no diarrhœa, eruption, or epistaxis. The affection known as pyæmia would seem to be more closely allied to this than any other, and, in fact, it may be a mild form of it, if there is any such thing as a mild form of pyæmia. I am indisposed, however, to believe in this latter suggestion, as I have seen cases of pyæmia terminate in death, without having presented, during their progress, any symptoms analogous to those under which I labored. Recently a poor fellow whose leg was amputated died in my wards, and to the day of his death, he was to all appearances as hopeful and as happy as could be. The absence, then, of prominent local lesions, and the tendency to recovery, rather than to death, will serve to distinguish this affection from that which we call pyæmia.

The *prophylaxis* consists of course in avoiding exposure to the cause, and is self-suggestive. There are unquestionably certain kinds of cases, and subjects, that are more dangerous

than others, and when the operator has reason to believe that his incision or puncture will be followed by a sudden gush of gases and matter, he should be particularly careful to turn away and hold his breath for a short time.

*The Treatment.*—A warm bath, a mild opiate and subsequent rest, should first be prescribed in these cases. On the following day a saline laxative should be given, and some refreshing effervescing draught will be grateful during the febrile condition.

After this, quinine, wine and the tonic tinctures are indicated. A cough mixture containing carbonate of ammonia will be very useful. I really cannot mention any specific remedy, that is, one supposed to be directed to the toxæmic condition, that is worth anything whatever. Iodides, bromides, chlorates, and sulphites, were to all appearances useless, and I believe I have tried them all. Who has cured a case of pyæmia with them? I think that so far, nothing but general principles will serve in these affctions, and that the lauded specifics, if of no use, are worse than useless, because they are annoyances.

So much for medication. The great matter to deal with is the anorexia. I really think it is no exaggeration to say, that if one were left to his own inclinations, he could readily succumb by falling into a fatal state of exhaustion.

The mere presentation of food is irritating in the extreme, and if at first the attendant succeeds in making the patient take a mouthful, it is all that can be expected. He is fortunate who has for care-takers under such an attack, those who know how to administer with the rare tact to distinguish that which would be grateful, from that which would annoy, and yet who have firmness enough to persist in getting the patient to take something, where he would otherwise peremptorily refuse. Milk and beef essence or soup should be given at regular intervals. A word as to beef essence or tea. My own experience teaches me, that nothing is more distasteful if pushed too persistently, and I have had the observation confirmed by others. The intervals, therefore, should

be longer than are usually prescribed, and in the interim cold milk or some solid food should be given.

Should the case progress favorably, the appetite will gradually return, and it is frequently stimulated by something piquant. Acid drinks are also grateful, but it will be some weeks before the patient enjoys with a relish the daily fare of ordinary life.

# NOTES ON MEDICAL CASES,

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The following cases have seemed to me of sufficient interest to be worthy of publication, either from their rarity or from their illustrating some special point in pathology or therapeutics. Most of them occurred during my connection with the Pennsylvania and Philadelphia Hospitals as Resident Physician, the remainder were met with in private practice.

Case I.—*Psoriasis of an acute character, terminating in death.*

J. K——, native of Ireland, aged 32 years, a man of about average height, good build, and apparently of the usual sanguine temperament of his countrymen, came into the medical wards of the Pennsylvania Hospital, March 27th, 1863,* with the following history. Up to within a month he had always enjoyed excellent health. He stated that he had not been a hard drinker, and denied positively ever having had chancre or any other syphilitic affection. His business was that of a boatman, and during the past winter he had been employed on the Delaware River in such capacity. His duties were such that a week or more of great exposure to the weather and unceasing toil, would be followed by several days of idleness, which he was wont to

* This patient was in the Hospital during the term of service of Dr. Levick, and was several times seen in consultation by the other members of the consulting staff, by whom, of course, the treatment was directed.

spend loafing around the stove of a hot, close bar-room. His diet had been very restricted, both in quality and variety: salt meats and salt fish, with bread, constituting almost his entire bill of fare, and in addition all of these were very inferior in quality.

According to his own account he was in tolerably good health up to the 1st of March, when he noticed little spots of small scales upon his arms. He was very positive that at no time were there vesicles or pustules. These spots rapidly increased in number and size, soon coalescing and spreading over the whole body. At the time of his admission, his condition was as follows: He was thin, but not emaciated; enfeebled, but by no means in a typhoid state. The entire surface of his trunk, neck, and head, lower and upper extremities, was covered with immense numbers of fine, thin scales, replaced on the hands and feet, and occasionally elsewhere, by large scales or even flakes. There were no patches, for the whole surface was equally involved. The skin felt dry and harsh to the hand, but not rough, except where the cuticle was very thick. There was no discharge whatever. At the flexures of the hands, feet, and large joints, the skin was cracked and bleeding; the nails grew very rapidly and irregularly, both in length and thickness, so that they were very prominent, crooked, and distorted. Occasionally one of them would be shed. Nothing abnormal could be detected in the structure or functions of any of the internal organs. He was ordered the most nutritious diet, with malt liquors, and to take the following: Liquor potassæ arsenitis, gtt. x, ter die. It was further directed that he be anointed morning and evening with cod-liver oil. At this time the nurse swept every morning from in and around his bed, a full pint of scales. These were mostly quite thin and small, but those from his hands and feet would often be an inch or more in length, and almost a line in thickness.

April 12th. No improvement whatever in skin, whilst his strength is failing, tongue becoming dryish, furred, and reddish.

April 20th. Skin becoming worse rather than better. Ty-

phoid symptoms becoming more pronounced; tongue drier. Has lost control of his bladder, apparently from want of power in the sphincter. Fowler's solution and anointing suspended. Ordered milk punch; a wineglassful every four hours, containing f℥ss. of whiskey. Beef tea, a wineglassful every four hours also. ℞. Ext. Nucis Vomicæ, gr. ss. Ext. Belladonnæ, gr. j. Pil. Ferri Carb., grs. iij, t. d.

April 25th. Patient rapidly failing, losing flesh very fast; indeed already much emaciated. Tongue dry, red, chapped. Diarrhœa has set in; also restlessness, wakefulness, and great distress at night. Morphia has recently been administered freely as required, and the following is ordered: ℞. Tr. Kino, f℥ij. Tr. Opii Camph. f℥j. M. S. Take three fluid drachms every three hours.

April 28th. Diarrhœa, and general condition of patient very bad. Pulse very feeble and rapid. Raw beef tongue. Abscesses forming in the cellular tissue of his arms and buttocks. A threatening of bed-sores on his back. Pills discontinued. Ordered: Opium to be used freely. Stimulants and beef tea to be pushed, and Acid. Sulph. Aromat., gtt. v, every two hours; also three lemons and half-dozen oranges daily.

May 1st. Condition about the same. Diarrhœa seems less. His stomach rejects the lemons. All direct medication discontinued except opium and stimulants.

May 3d. Skin apparently a little better. General condition about the same. Ordered: ℞. Ol. Terebinth., f℥j. Curaçoa f℥ss. Mucil. Acaciæ f℥ijss. M. et ft. emuls. S. Take two fluid drachms every three hours.

May 9th. Seems slowly improving. General condition a little better. Tongue more moist. Skin shedding fewer scales. Diarrhœa almost gone.

This apparent amendment did not, however, last any time. Although the skin shed fewer scales, yet the exhaustion and loss of flesh steadily progressed. Horrible bed-sores formed upon his nates; numerous small and large abscesses riddled the cellular tissue of his extremities. He

became frightfully emaciated, and died May 23d, apparently of sheer exhaustion.

No autopsy was attainable; but, though carefully watched, at no time during life could any derangement of an internal organ be detected, save those above mentioned.

Remarks.—The case just narrated seems, in many points, to be a rather singular one; an examination of the works of Bateman, Thompson, Willan, Cazenave, Green, Hunt, Alibert, Rayer, Fox, Hardy, Wilson, Logan, Devergie, &c., &c., as well as a somewhat extended search through the Journals and Retrospects, having failed to find an exact parallel.

The disease was undoubtedly more closely allied to the Psoriasis inveterata of authors than to any other affection with which I am familiar; but that is described as essentially chronic in its course, and as not complicating life, except in individuals whose constitution has been shattered by long-continued dissipation and privation, or by age; and even in such very rarely.

In this case the hardships and exposure were of recent date. The man was young, and naturally very robust and healthy, so that there was no reason whatever for classing him with broken-down subjects.

Prof. Hebra speaks of psoriasis as being essentially a disease of the robust—one very rarely met with in others than such—and says that only in one instance has he met with it in an individual suffering from a dyscrasia—a case of phthisis. (Wiener Spital's Zeitung, 1859.) M. Devergie states that out of 227 cases which he had seen, 206 had had an excellent constitution.

The present instance can not be considered an exception to the law, thus enunciated, that the subjects of psoriasis are generally robust. Prof. G. B. Wood, in his Practice, says of this affection: "It is never fatal unless complicated with internal disease, as gastro-intestinal inflammation. In this way, it is sometimes fatal in the old." During the last few weeks of the life of J. K——, he was often troubled with a watery diarrhœa, which may have been purely colliquative,

the combined result of simple exhaustion and alteration of the blood, yet, one could not help suspecting an irritation of the alimentary mucous membrane, similar in character to that causing the exfoliation from the skin. The symptoms were, however, never sufficiently active and pronounced to mark with any certainty the existence of gastro-intestinal inflammation, but seemed rather those of irritation. The diarrhœa of course accelerated the downward progress of the patient, but apparently just in the same way as the night sweats and colliquative diarrhœa of advanced phthisis. It could, in this instance, no more be assigned as the cause of death than the bed-sores and the abscesses, which, whilst merely necrobiotic changes, the results of the typhoid, half-dead condition of the patient, reacted so as to still further diminish the vital forces. It would have made the history more complete could a post-mortem have been obtained, but the pernicious system which prevails in the Hospital made it necessary to get the consent of the relatives, which was in the present case simply impossible. Yet so carefully were the actions of the internal organs watched during life, with negative results, that it is scarcely possible that any serious disease existed in them, unless it was something having its origin during the last week or two, when he was too exhausted for close examination.

During the course of the case, the idea of a scorbutic taint frequently suggested itself to the medical attendants. The history certainly favored such a supposition, but no marked indications of this diathesis could be found in the person of the sufferer, and when, with the hope of such a condition of system being at the foundation of the trouble, lemon-juice, oranges, and fresh vegetables were ordered, they served rather to aggravate than ameliorate the symptoms, increasing as they did the intestinal irritation without otherwise influencing the course of the disease. Death must, I think, in view of these circumstances, be considered to have been produced in a robust subject by uncomplicated psoriasis, or psoriasis only so far complicated as any lingering exhaustive disease must almost of necessity be. Again the attack dif-

fered from the ordinary forms of P. inveterata in the circumstance that its history and course whilst under observation were essentially acute.

The positive and consistent statements of the patient were, that he had not had any "humor" on his skin whatever, until within a month of his admission, and his appearance was quite different from that of one who had long suffered from the chronic malady. The skin, though, dry and inelastic, was not at all thickened, the scales though numerous enough, were thin and small, save on the palms of the hands and soles of the feet; nor did they stand out in strong relief from the skin, so as to give the surface of the body the appearance of the "rugged bark of an aged tree," nor was there anywhere poured forth a glutinous fluid drying up into incrustations; indeed, the surface had more of the red, smooth, shining appearance of P. confluens than that of the other variety. Nevertheless, the mode of attack, the small patches of dry scaly skin gradually increasing, coalescing and involving the entire surface, and the whole appearance and history of the case throughout, mark it as psoriasis, and it may be looked on as an acute case of P. inveterata.

As long ago as the days of Galen, the relationship between psoriasis and arthritic affections was recognized, but in the case under consideration, no such taint was discoverable, nor could any traces of syphilis be found. Many authorities also speak of an hereditary predisposition, but none of the progenitors or relatives of this man had ever suffered similarly that he was aware of.

Willis, in the last century, was the first, I believe, to call attention to the circumstance, "that a constant diet of dried and *salted meats*, or pork, or shell-fish," are among the causes of psoriasis. (De Medicamentorum Operationibus.) Among other authorities confirming this, may be mentioned Thompson, who says, "Among exciting causes may be reckoned excesses in diet, intemperance; frequent use of salted meat and salted butter and pork; much fish; and hard, poor, indigestible food of any kind." (Practical Treatise on Diseases affecting the Skin. Edited by E. A. Parkes, London, 1850.)

Willan believes exposure and sudden changes of temperature, capable at times of lighting up the disease. (On Cutaneous Diseases, vol. i.)

A reference to the history of the present case, before given, will show that the only discoverable causes of the affection were a meagre diet of inferior salt food, and exposure to sudden atmospheric changes. It is worthy of remark, that the man himself ascribed his attack especially to the alternations of the hot, reeking air of the bar-room, with the cold, damp air of a partially frozen bay, with its storms of sleet and hail, which he was called on to battle with. It seems then, a justifiable inference, that the exposure and peculiar diet did produce the attack, and that, too, in the absence of any discoverable predisposing cause.

### Case II.—*Purulent Parotitis; Death.*

The following case is chiefly interesting, as showing the facility with which diseases, commonly trivial, may in certain states of the system become of grave import.

S. M——, a youngish woman, came into the Philadelphia Hospital, April 4th, 1862, suffering from chronic diarrhœa and general debility. She belonged to the lowest class of prostitutes, and the diarrhœa was apparently largely dependent upon debility, brought on by dissipation and reckless exposure. The patient was able to be up, but under confinement to bed and other appropriate treatment, her diarrhœa slowly improved. On the 18th of April, she first complained of soreness and stiffness of the jaws. The next day swelling at the angle of the jaws manifested itself on both sides with increase of the soreness. All the usual local symptoms of mumps now rapidly came on; the swelling became very great and deglutition difficult; in addition to these the strength of the patient began to fail; the pulse to increase in frequency; the tongue to become dry and brown, and by the 23d, she was in a very pronounced typhoid state, with subsultus tendinum, low muttering delirium, carphologia, &c. In spite of active stimulation she rapidly sank, and died on the 26th, without any other symptoms, save those

of constantly increasing *typhosa* and swelling, soreness, and other local changes.

*Autopsy.*—*Cadaver* not strikingly emaciated. *Chest.* Viscera normal. *Liver*, very large and extremely fatty. *Small intestine*, with no pronounced lesion; the mucous membrane smooth and pale, except near the ileo-cæcal valve, where it was much injected. *Large intestine*, with the mucous membrane slightly thickened and congested, with dark ecchymoses in places. *Parotid glands*, very much enlarged, completely infiltrated with pus, which ran out of them when cut; very soft, so that the finger readily pushed them to pieces, in a word, looking as though their substance was dissolved in pus.

That this was a case of mumps, is shown by the fact, that a woman in the same ward, under the care of my colleague, Dr. Jamar, convalescent, I think, from pneumonia, was shortly after this seized with similar symptoms, the swelling at first affecting one side and subsequently the other. She finally recovered after the formation and discharge of an abscess in one of the parotid regions.

### Case III.—*Latent Peritonitis from Cystic Degeneration of the Ovaries.*

A youngish woman, a prostitute by occupation, came into the wards of the Philadelphia Hospital, June 10th, 1862, with the following history:

For several years, being in the lower ranks of her calling, she had been subject to the influence of the worst forms of dissipation; had had repeated attacks of gonorrhœa and chancre; yet she stated that she enjoyed tolerable health until within two or three weeks, when she first noticed an enlargement of her belly. At this time she did not feel sick in any way, except merely debilitated. Her strength, however, continued to fail, and she had slight, shooting, transient pains in her abdomen. Vomiting now came on, and caused her so much distress and weakened her so rapidly as to induce her to apply at the Hospital.

On her entrance her condition was as follows: General

condition that of prostration; pulse feeble, rapid; skin cool; chest, nothing abnormal discoverable; abdomen swollen, not tender on pressure, with a rather obscure sensation of fluctuation on tapping with the fingers; area of percussion dulness abnormally large over the liver; some tendency to diarrhœa; has chronic gonorrhea; complains chiefly of incessant vomiting; her stomach so irritable that it is almost impossible for her to retain sufficient nourishment to sustain life. She was placed on a supporting diet; chloroform, hydrocyanic acid, and other antemetics administered, and moderate purging, to relieve her supposed abdominal dropsy.

June 12th. No fever. Vomiting not relieved by any of the remedies; strength failing. Purgation stopped on account of its weakening her. From this time forward, until her death, which occurred in a few days, the vomiting continued, the belly grew sensibly larger, she became more and more exhausted, muttering delirium came on, and finally she sank away, without seeming to feel any influence from the supporting measures adopted.

*Autopsy.*—*Cavity* of the chest very much encroached on by the abdomen. *Lungs* greatly compressed, otherwise normal. *Heart* rather small, fatty, and very flabby. *Abdomen*—When opened, its lower portion was seen to be filled with numerous large and small cysts, containing a clear amber-colored liquid. The walls of these cysts were very thin and semi-transparent; so delicate were they that a rough touch of the hand would often cause their rupture. The source of these could not be discovered; many of the small ones seemed to be lying free in the cavity of the abdomen. *Intestines*, *liver*, all the *abdominal viscera*, closely glued together by a large amount of lymph. *Peritoneum* everywhere thickened and covered with the same material. *Ovaries*—One had completely disappeared; no trace of it could be found on thorough searching. The other ovary, with several cysts, some of considerable size, similar to those above described. *Uterus* normal. *Vagina* enlarged.

Remarks.—There can be no doubt that in this case the primary disease was cystic degeneration of the ovary. The

immediate cause of the peritonitis was probably the irritation produced by the presence of the numerous sacs, abnormities in the peritoneal cavity; it *may* have been excited by the rupture of one of the sacs, though this could not be established by the history. The principal point of interest is the complete latency of the disease. Though the swollen abdomen of course attracted attention in an obscure case, yet as there was an evident although somewhat obscure sense of fluctuation, evident enlargement of the liver, no especial abdominal tenderness, and a past history of reckless exposure to everything calculated to ruin the vital powers, and of repeated attacks of venereal disease, the case was looked upon during life as simply one of general breaking down, with fatty liver and ascites. It is impossible to fix with certainty the date of the commencement of the inflammation; very probably it occurred about the time that she began to complain and feel sick. Great obscurity of symptoms is a characteristic of tubercular peritonitis, but here the disease had no such origin. In the class of subjects to whom this unfortunate belonged, it has seemed to me that there is a very marked similarity in their general diseases, to those of old persons—that the condition of system is that of premature old age, a state of not simply acute vital exhaustion, but of a gradual, chronic, irreparable destruction of the vitality of the tissues. In this connection the following almost unique case of latency of peritonitis from perforation by the ulceration of typhoid fever, is interesting:

Case IV.—*Perforation from Typhoid Fever; Latent Peritonitis.*

J. M——, aged about 20, came into the Pennsylvania Hospital late in the afternoon. He was brought in a carriage to the Eighth Street gate of that institution, and walked up to the main building, a distance of over fifty yards, sat some little time in the waiting-hall, and then walked up two flights of stairs into the medical wards, of course being helped by a friend. Dr. Levick happening to be in the house at the time, we went up stairs directly afterwards, and found him sitting on a chair at the foot of the bed. The history ob-

tained was not a very clear one. He had landed from an emigrant ship but a few weeks previously, and for the past three or four weeks had been unwell, without any very positive symptoms that he could tell of; growing worse rather than better, some philanthropic persons, finding out his necessities, brought him to the Hospital. A cursory examination was made at the time, without eliciting anything definite. Some little tenderness on firm pressure on the abdomen was noticed, but it was not marked. As the man seemed weak, and a suspicion of typhoid fever existed, he was ordered to bed; some slight anodyne draught administered, and further examination postponed until morning. He died suddenly that night, without any one suspecting that he was in a very critical condition, as far as I know.

*Autopsy.—Cadaver* thin, not very much emaciated. *Abdomen:* On opening it, the intestines and viscera were found completely glued together by evidently recent lymph; the *peritoneum* generally injected and coated with coagulable lymph. *Viscera* healthy; *small intestine* with Peyer's patches in various stages of degeneration, most of them represented by the long, oval ulcers, so pathognomonic of enteric fever, near the ileo-cæcal valve, with one ulcer which had eaten through the bowel, forming a well-marked perforation. No pus was to be seen. *Thorax: Viscera* normal.

Remarks.—At what time in the history of this case the perforation took place, precisely, it is impossible to say, but, from the post-mortem appearances, the peritonitis must have been of several days' duration; yet the man had strength to ride a considerable distance, and then with aid to walk fully a hundred yards and up two flights of stairs, dying a few hours afterwards of the exhaustion consequent upon the effort. Under proper care would he not have had a fair chance of recovery?

The following case is here reported as an instance of the latency of tubercular peritonitis, before spoken of; it is also somewhat rare to see such general tuberculization in the white adult:

CASE V.—*Tubercular Peritonitis; with General Tuberculosis.*

H. M. died in the medical ward of Philadelphia Hospital, May 20th, 1862. During life his symptoms were those of acute inflammation of the lungs supervening upon advanced phthisis, and as the diagnosis of such a condition alone was made out, and such cases were legion, no record of his symptoms was kept. He was not at all jaundiced, and had no diarrhœa, but on the contrary was very constipated.

*Autopsy.—Chest: apices of lungs* solidified with softening tubercles, with several cavities. Posterior portion of lower lobe of right lung hepatized. Costal and visceral divisions of the left pleura completely adherent, with a calcareous deposit of about half an inch in diameter upon the diaphragm.

*Abdomen.*—Cavity of peritoneum full of effusion, with a great deal of lymph. Liver, stomach, and diaphragm completely glued together. Between the diaphragm and right lobe of liver an abscess, containing about a gill of very thick pus. In substance of left lobe several abscesses, the size of marbles, and numerous very minute purulent foci, some mere points. These contained thick pus, and a yellow cheesy material, precisely resembling softening tubercle. Kidneys healthy.

CASE VI.—*Purulent Peritonitis; Recovery under the Opium Treatment and Blisters.*

I was called to see Mrs. J——, a spare woman, about middle age, married, but childless, perfectly temperate, unaccustomed to the use of stimulants, either in the form of alcoholic drinks or opium.

Thursday evening, September 13th, 1866. On my arrival and subsequently I gleaned the following history. She had never been pregnant, but formerly had suffered for years from an obscure uterine complaint, not sufficiently severe to prevent her going about. Of latter times this had been much better, and her health had been good for many years. Her habits of life had been very active, and her powers of withstanding fatigue much above the average.

On Wednesday, the 12th of September, she ate heartily of carrots and green corn for her dinner, and for her supper indulged freely in cucumbers.

About 11 P.M. the same day she was suddenly seized with violent cramping pains, commencing, according to her statement, just below the pit of the stomach, and thence radiating over the whole abdomen. These pains were constant, but yet every few minutes would undergo paroxysmal exacerbation, when they would be extremely severe.

At this time, according to all the statements, there was no vomiting; neither was there any abdominal tenderness; but on the contrary, the only relief obtainable was by means of firm pressure on the belly, so that she spent most of that night bending over a low chair, whose back was pushed up firmly against her stomach. Dr. B——, a homœopath, somewhat notorious in this city, was sent for, when she was first taken, and was with her off and on most of the next twenty-four hours. But the globules would not work, vomiting came on, the pain grew worse and worse; the bowels at the same time not being moved. Some time early Thursday morning the women around her administered a teaspoonful and a half of laudanum, which, they positively asserted, was retained, and produced no perceptible effect whatever. Finally, her husband becoming disgusted at the want of any action by the remedies applied, came for me. It was now about 11 P.M., just twenty-four hours after the first seizure. I found her in about as extreme torture as it has been my lot to see; delirious with agony, with a face pale, haggard, marked with deep lines of pain and anxiety; lying in a state of semi-unconsciousness, yet constantly changing her position, especially when the paroxysms occurred, which was about every five minutes. Now on her back with her knees drawn up and head bent forward; now crouching on the floor on her hands and knees; now sitting on a chair; all the time moaning, groaning, or screaming, according as the pain was less or more severe. In all her attitudes she preserved the flexed limbs and bent-forward trunk,

and consequent abdominal relaxation, so pathognomonic of peritonitis and enteritis. Vomiting generally accompanied the paroxysms; it was violent, with much straining and the rejection of a thin liquid resembling dirty water. The pain was not located in any special part of the abdomen, which was much swollen and exquisitely tender. The patient, most of the time, took little or no notice of what was passing around her; rousing up, however, when spoken to, and answering in a *clear*, *distinctly articulated*, *steady voice*. The skin was cool and moist; the pulse running over 150, thready; the tongue very thickly coated.

The diagnosis of peritonitis was made, and four and a half dozen American leeches were applied to the iliac regions. As they drew, the vomiting ceased, the pains grew less, and by the time they were filled the patient was quiet and comparatively comfortable. Before they had all fallen off her bowels were relaxed, and she passed a large, dark, very fetid liquid stool.

Morphiæ Sulph., gr. ¾, was exhibited immediately, and the following prescription ordered: ℞. Morph. Sulph., gr. iss.; Hydrarg. Chl. Mit., grs. xij; Ft. pulv. in chart. xij div. S. One every hour. Also warm fomentations to the abdomen, and the leech-bites to be allowed to bleed.

Friday, 12, noon. Patient has had several stools similar to the one passed immediately after leeching. General condition about the same. Does not appear to be suffering much. Voice the same. Vomits occasionally. Thirst pronounced. Pulse 120. Tongue thickly coated, dry. Abdomen much swollen; its tenderness very marked, perhaps not so great as during the preceding evening. Prescription had been taken regularly. A 4-grain opium suppository ordered every hour, and patient confined to a farinaceous diet without milk. The abdomen covered with a large blister.

Friday evening, 7 P.M. Patient has had six suppositories (Opii, grs. xxiv.) Ordered blister, which had drawn well, dressed with Morph. Sulph., gr. ss., and all medicines to be intermitted.

Saturday morning. Patient through the night was very

stupid and heavy; had several dark, liquid, very fetid stools. General condition not much changed. Complains not of pain, but only of excessive thirst. Tongue very foul and dry. *Has marked strabismus.* No evidences of action of calomel upon her mouth or breath, though she has taken the twelve grains. Ordered: 3 grains of Opium every two hours by the mouth, and Morph. Sulph. gr. ss. to the blister.

Evening. Patient not much under the influence of opium, restless; has passed, during the day, numerous dark and fetid liquid stools, and, towards evening, a *quantity of unaltered corn, fragments of carrots, and cucumber seeds.* Ordered: Opium, grs. ij, Plumb. Acet., grs. iij, every hour, and Opium suppository (grs. iv) every two hours in addition.

Sunday, September 16th. Patient seems much the same, the tenderness perhaps a little less. Diarrhœa very much checked by medicine, but she still has a loose passage every four or five hours. Has taken the prescription regularly; does not seem much under the influence of opium; ordered to stop the suppository, and give in its place a three-grain opium pill.

Monday morning, September 17th. Patient better, the pulse less frequent, the tongue cleaning a little at the edges. Has had medicine regularly as far as I can perceive. Seems very much under the influence of opium, very heavy and stupid, pupils decidedly contracted. Diarrhœa almost altogether checked. Treatment continued.

Monday evening. Patient stupefied. Three-grain opium pill suspended at 8 P.M.

Tuesday, September 18th. Patient decidedly better. Strabismus less marked. Tongue evidently cleaning at tip and edges. Abdominal tenderness less, very little tendency to diarrhœa. Opium and acetate of lead pills suspended. Ordered simply three grains of opium every two hours. Diet changed to chicken soup, a little beef tea, &c., &c., as stomach could bear them.

Tuesday evening. Patient more restless. Ordered to take opium pill (two grains) every hour.

Wednesday. Patient about the same. Treatment continued.

Thursday. General condition of patient not much changed. More tendency to diarrhœa. Ordered Opium grs. ij, Plumb. Acet. grs. iij, every hour, and a three-grain opium pill every three hours, which was taken through the day and night.

Friday, September 21st. Patient improving. Strabismus less marked. Tongue cleaning from the edges. Diarrhœa checked.

From this time for a few days, the general condition of the patient improved rapidly; she gained strength; the pulse fell to eighty per minute and became stronger; all tendency to vomiting passed away; the passages became very natural; the strabismus disappeared; the *voice grew stammering;* the tongue cleaned nicely, and convalescence seemed about to be established. Both the swelling and tenderness of the abdomen were very much lessened, but were very far from disappearing. The treatment consisted in the cautious withdrawal of the opium, and the nourishing of the patient with beef tea and similar easily digested food.

About the 27th of September, she began to complain of "sweating spells." These at this time commenced with an apparently causeless and sudden feeling of prostration, shortly followed by a cold sweat so profuse as to completely saturate her clothing. This would be followed by great languor, persisting for several hours. These spells at first were regarded simply as indicative of debility. She was ordered to be bathed with a saturated watery solution of alum, and with alcohol. Wine and brandy were freely allowed her, and aromatic sulphuric acid administered. None of the remedies had any effect. The sweating spells rapidly increased in number and severity, and the strength of the patient decreased. At the same time the swelling and tenderness of the abdomen underwent a marked increase, and vomiting came on. I extract the following entries from my note-book.

October 4th. Excessive tenderness in right hypochondrium, not so marked over the abdomen generally. Stools nearly

normal. Patient complains of great thirst after spells. Pulse 78. Tongue clean.

October 6th. General exquisite abdominal tenderness. Patient vomiting constantly. Ordered: ℞. Acid Nitro-muriat., f℥iij; S. Take 5 drops three times a day.—℞. Quin. Sulph., grs. xij; Acid. Tannic, grs. vj; M. et ft. mas. in pil. xij div. S. One three times a day. Patient also to take twelve grains of opium during the night.

The spells now assumed a very serious aspect; they were very numerous, sometimes as many as six in twelve hours, were accompanied with great weakness and profuse sweating, and always preceded by a chill, which was frequently so severe as to shake the bed on which the patient lay, in a very marked manner. The diagnosis was made of pus in the abdominal cavity, very possibly localized, and the patient informed that she could not expect immediate relief, but might hope to weather the storm. The most distressing symptom was the vomiting, which, though occasionally it would lull for a day or so, was most of the time incessant.

It constantly occurred independently of the ingestion of anything, but was always provoked by eating or drinking, so that it became a difficult problem, how to nourish the patient. The matters vomited were *ingesta*, mucus, and often considerable quantities of bile. There was now no tendency to diarrhœa. The treatment adopted consisted in the use of all measures which could be thought of, to check the vomiting, and sustain the patient, and constantly repeated blistering of the abdomen, with the free use of opium.

About the last of October, the patient becoming utterly disgusted with the apparent want of power of the means employed for her benefit, grew so importunate that her husband was forced to call in a notorious Indian doctress, so styled, practising in the upper part of the city, in whom Mrs. J—— had unbounded confidence. This worthy diagnosed first "cancer of the womb," and then that "one of the strings of the liver" had something the matter with it, I have forgotten exactly what, but had the practical sense not to disturb the patient much with drugs, but to put blister

upon blister on her abdomen with marvellous rapidity. During the first three or four days of her attendance there was a cessation of the vomiting and an apparently great amendment of all the symptoms; but the effects of an unbounded faith in the crone who veiled herself in mystery and "searched the Rocky Mountains" for their secrets, soon wore off. Mrs. J—— relapsed into her former condition, and finally came again into my hands, somewhat the better for her severe course of blistering. Under the same course of treatment as was heretofore indicated she slowly improved, and in January, 1867, I had the pleasure of seeing her at my office, she having escaped the perils of homœopathy, Indian doctresses, and purulent peritonitis!

When last heard from (August, 1867), she was keeping house in the country, not so well as before her attack, and still liable to pains in her abdomen on over-exertion or cold, but yet able to do housework, to milk, and to garden.

Remarks.—The history of this case seems clearly to indicate that the first seizure was simply a painful spasm of the alimentary canal, excited by the irritation of substances which had passed from the stomach undigested. The suddenness of the seizure and the absence of any tenderness in the onset, seem to prove this. Under the do-nothing treatment practised, however, the cause of the irritation persisting, excited first enteritis and finally peritonitis, which latter existed on the Thursday night when she was first seen by a regular physician.

The correctness of the diagnosis of pus in the peritoneal cavity in the latter stages may be doubted in this case, in view of the favorable result, the possibility of the later symptoms being those of hysteria, superadded to those of great debility, presenting itself. To this it may be remarked —First. The debility was not *so great* in the earlier portion of the time during which the "sweating spells" lasted (the pulse was only 78). Secondly. The slowness with which these symptoms came on,—not suddenly, but requiring some ten days for their development,—the regular agree-

ment in the march of the local and constitutional symptoms, both downward and toward health, and finally the slowness of the recovery and the absence of any marked hysterical symptoms,—cannot be reconciled with this view. In this connection it is proper to state, that Dr. J. M. Da Costa saw the case two or three times in consultation, and Dr. Caspar Wistar once, and both expressed their full concurrence in the diagnosis of the presence of pus in the peritoneum.

There are one or two symptoms worthy of special attention: the strabismus, which showed itself early in the disease, and disappeared as the patient improved. What was its cause? Was it a hysterical symptom? Did the large doses of opium cause it? Again, the woman has been a confirmed stutterer ever since her earliest childhood, and in conversing with her since her recovery it is often difficult to understand her on account of the stammering, hobbling speech. Yet, when very ill, suffering severely, her voice was as steady and articulation as distinct as any one's, and as she became better her old broken speech came again, not suddenly but gradually. The passage over the undigested matters of a number of large liquid stools is also worthy of notice.

The especial interest of the case is, however, in the therapeutic point of view. It illustrates, strikingly, the importance of early medical treatment. A dose of castor oil and a leeching, when medical (?) aid was first sought, would, in all human probability, have cut short the attack.

Again the immediate effect of the local depletion in subduing the tense congested condition of the bowels and peritoneum, so as to bring ease and to allow of a fecal passage, is worthy of notice. Although the rapidity of the pulse, the exhaustion of the patient, and stage of the inflammation appeared to make it of doubtful expediency, yet would not a moderate general venesection have been of advantage, followed by the local depletion?

The treatment of peritonitis by opium in large doses is of course not a new one. Dr. Graves used it in several cases many years ago, and others have followed after him. The

value of it, however, is perhaps still not entirely settled. In acute sthenic forms of the disease, seen sufficiently early, it certainly ought to be preceded by copious general and local depletion, but the accounts of its advantages given by Cusac, Gooch, Churchill, Patterson, Clark, &c., in puerperal peritonitis, and by Stokes, Mackey, Hughes, Wood, Louis, Griffin, and others, in peritonitis from visceral rupture, traumatic or otherwise, seem to indicate that in cases in which depletion is not called for, or at other times after depletion, it ought to be our main dependence, sometimes combined with the mercurials, sometimes without them.

In the present instance, the enormous doses of acetate of lead must have had a great influence on the system. Over one hundred grains of this substance were taken in thirty-six hours. The amount of opium administered, although immense, did not nearly equal the maximum reached by Prof. Clark in the treatment of the puerperal form of the disease. Probably at no time did Mrs. J. actually take more than sixty-five grains of opium in twenty-four hours; whereas, in a case of the Professor's, "In the second twenty-four hours she took opium, gr. cxlviij, and morphia lxxxj, or opium four hundred and seventy-two (472) grains." (Ramsbotham's Obstetrics, American edition, p. 538.) Surely this is, as the Professor remarks, "horrible dosing," even in the case herein described; yet both cases recovered. That the therapeutic power of these immense doses simply grows out of their checking peristaltic action, and quieting nervous excitability, as some think, seems untenable. Would not smaller doses do all these? It seems to me that there must be some other way in which they act. Whether it be by contracting the arteries, as Dr. C. Handfield Jones appears to think, by restoring the "balance between the nervous and vascular systems," as Dr. W. H. Ranking suggests, or by acting as a "tissue sedative," or in some entirely unknown manner, who can decide in the present state of our knowledge?*

* As a curious instance of the instability of opinions *how* medicines act, the following may be quoted from the writings of a distinguished British author. Writing in 1859, on the action of opium, he says: "Its action on the

At present, must we not be satisfied with the fact, that *opium in immense doses has great controlling power over certain inflammations, making it worthy of a first rank among antiphlogistics?* According to the authority last cited, opium is especially applicable in "inflammations of organs or tissues largely supplied with ganglionic nerves." Of course during the administration of these very large amounts of such a powerful drug, the patient must be closely watched. Another practical observation is, to see if the opium be in solid form, that the *pills are very recent and soft*, else they may accumulate in the bowels and produce sudden disastrous effects. In those cases, such as wounds of the peritoneum, in which opium is given in anticipation of peritonitis—more as a prophylactic than as a direct therapeutic agent—the last precaution is especially needful, and very great care must be exercised in using the remedy in any doses which would be dangerous in health. The following case may serve to illustrate this point. Although strictly surgical, yet its whole interest is in connection with the opium administered, and therefore, it is not out of place in this connection.

CASE VII.—*Use of Opium after the Operation for Strangulated Hernia, to Prevent Peritonitis.*

I was called about 10½ P. M. to see Mr. ——, a robust man, aged about 30 years; found him suffering from an oblique inguinal hernia, which had descended the previous afternoon, when he was nearly two miles from home. Although in great pain, he had walked the distance with it thus, getting home near 5½ P. M. The bowel had not been up since. The strength of the patient was not much affected; the expression of face was not anxious, and the pulse was nearly

sympathetic and vaso-motor nerves is probably similar; it will *relax contracted arteries*, and admit a free transit of the blood. This is probably the rationale of its action in the cold stage of ague." Writing in 1862, the same authority says: "I am inclined to believe that the soporific action of opium is, at least in part, dependent on *contraction* of the *cerebral arteries*, occasioned by the influence of the drug on the vaso-motor nerves of those vessels. The supply of blood being shut off, the functions of the hemispheres are for the time in abeyance!"

natural, though he was suffering much and constantly vomiting dark watery matters. The hernia was irreducible, and he was operated on at 1 A. M., the same night, by Dr. Agnew. The sac was found to be large and chiefly filled with omentum; the gut was dark-red, but not chocolate-color, and apparently in very good condition. Very little blood was lost during the operation, and the patient reacted well from the anæsthetic. About an hour afterwards a small scrotal artery started to bleed, and owing to delay in sending for me, a great deal of blood was lost. A four-doubled comfortable under him was soaked through, and great clots of blood laid on the bed and between the folds of the comfortable.

At the consultation it was agreed to administer one grain of opium every hour, until some effects were produced. Through the day the patient appeared comfortable, with good expression of face and a perfectly clear composed mind. Pulse 96; skin rather hot and dry; abdomen sunken, not tender. At 6 P.M. Dr. Agnew saw him, with me; remarked there was nothing like narcotism, but as there was a little tendency to doze he would be careful about the opium. At 9 P.M. the patient was sleepy, not at all narcotized; pupils somewhat contracted. Some sixteen grains of opium had been given in about as many hours. The opium was stopped, but he was ordered to have one grain every three hours, commencing at 12 midnight, provided he did not seem sleepy; if so, nothing to be done. At 4 A. M. I was summoned suddenly with the news that the man was dying. The attendant represented that up to 12 o'clock, midnight, he had been very quiet, and on being asked, in a natural tone of voice, at that time, how he was, he answered, "Pretty well;" also, that a pill was then given. The nurse further stated that he was restless for some time after this, and between two and three o'clock had an inward convulsion, since which he had been in the condition he still was, which was as follows: Comatose; pupils strongly contracted, insensible to light; eye also entirely insensible to the touch; no motion of lids when finger was laid on the ball; pulse 150; skin hot and dry; breathing only at long intervals,

and then half a dozen sobbing rather than stertorous inspirations. Hypodermic injections of sulphate of atropia dilated the pupil, but produced no other sensible effects. Various other remedies were used, but the breathing became slower and slower until 7 A. M., when the spells occurred only about every three minutes, when he would take five or six deep inspirations. During the intervals the pulse would become almost imperceptible and the surface very blue, but when the breathing would come on the former would rapidly regain its force and the latter its color. Galvanizing the phrenic nerves had no effect. The lungs were full of coarse and moist fine râles. About 8 A. M. the breathing suddenly became natural and the eyes showed some sensibility when touched, and it seemed as though reaction was about to take place. The skin still kept hot and dry. Finally the pulse began to grow weaker and irregular, and the patient died about 11 A. M., through failure of the circulation. No autopsy was attainable.

Death in this instance probably was the result of secondary shock, or of intense peritoneal congestion. Yet, the peculiar breathing, the blue surface, contracted pupil, and profound insensibility, all sufficiently pointed towards opium, to create a terrible suspicion that the drug was in some degree responsible for the result. The suddenness of the occurrence of the symptoms, rapid feeble pulse with a hot dry skin, and the very intenseness of the insensibility, would seem to negative this, however. Then no decided symptoms appeared until some three or four hours after the opium had been for the most part suspended. During my residence in the Pennsylvania Hospital, a man who was very badly scalded by the explosion of a locomotive boiler, some mile and a half or two miles from the building, ran all the way to the Institution, was put to bed, and died in three or four hours of nervous shock, with symptoms somewhat similar to those just described. If the opium did play an active part in the causation of death there must have been a sort of cumulative action. On inquiring at the druggist's, it was ascertained that the pills of opium were *not freshly made up*,

but had been prepared at some indefinite time in the past, hence the possibility of their not having been regularly absorbed as given.

Whatever view may be taken as to the cause of the death, the appearances during the last few hours of life were such as to make one cautious about the use of opium in very large doses, when there is no *existing* peritonitis.

# CASES

OF

# PROGRESSIVE LOCOMOTOR ATAXIA,

WITH REMARKS.

By JAMES H. HUTCHINSON, M.D.,

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The writer of this paper has had his attention attracted to this disease, and in addition to frequent opportunities for observing patients afflicted with it, has had three well-marked cases under his immediate care: two of these are known to have terminated fatally in the past year, the other passed into the hands of another physician, and the result is unknown. It is of course to be regretted that in the two fatal cases no post-mortem examination was made, but the symptoms during life so closely resembled those described by Duchenne and Trousseau, that there can be no reasonable doubt that an autopsy would have revealed the lesions almost constantly found by Trousseau, Friedreich, Eisenmann, Clarke, and others. The duration of the disease is generally so long, spreading, as it does, frequently over fifteen years, that every physician of extended practice will see many cases, while the opportunity for examining the bodies of those who have died of it, will rarely occur to him. Thus

in a paper in the St. George's Hospital Report, 1866, Mr. J. Lockhart Clarke reports several cases, eight of which appear to have been well-marked Locomotor Ataxia, but in a single instance only is there any reference made to a post-mortem examination.

In regard to a name for the disease, that of Progressive Locomotor Ataxia, is as little objectionable as any. Trousseau paid too high a compliment to the distinguished Duchenne, when he proposed to call it Duchenne's Disease, for not only was Duchenne not the first to describe the group of symptoms to which the name Ataxia has been given, but he actually placed the lesions of the disease in an organ which is rarely found to have undergone any morbid change. Romberg before him had described the disease under the name of Tabes Dorsalis, and indicated the seat of the degeneration.

The first case here reported ran a very long course, as many as seventeen years elapsing between the occurrence of the first symptom and death.

Case I.—Thomas W. Williams, æt. 48, admitted into the Episcopal Hospital, January 2d, 1864. The following are the notes taken at the time of his admission.

The patient appears to have no settled occupation; is married, intelligent, and apparently better educated than is usual in hospital patients. In early life he was unusually healthy, having had no more serious ailment than slight irregularity of the bowels, and has led a moderately temperate life, occasionally, however, indulging freely in alcoholic stimulants. He cannot attribute his present condition to any accident; in early life he was active and strong, and excelled in athletic exercises.

Fifteen years ago, he became sensible of slight impairment of vision, and in consequence consulted two physicians of this city, by whom he thinks he was slightly benefited, but he states distinctly that he never regained the full use of his eyes. Soon after, without apparent cause, he was troubled with neuralgia (violent pains) in the limbs, especially the

legs, but at no time in the head; the pain he describes as excruciating. When questioned in regard to pain in the back, he says that this was present at times, but was rather dull and aching in character than acute.

The symptoms above detailed continued somewhat intermittingly for nine years, after which lapse of time, he found he was no longer able to walk even a short distance without excessive fatigue, and a little later he discovered that he could not walk steadily in the dark, and that he was unconscious of any irregularity of the ground over which he might be passing.

The attention of the resident physician at the Hospital was at once arrested by the great peculiarity of the patient's gait, the lower extremities being jerked forwards and outwards at every step; he was observed, also, to watch his feet very closely. When told to close his eyes or to direct them to the ceiling he could not stand erect without support; and so, too, a loss of equilibrium was the result of an attempt either to stand with his feet drawn very close to each other, or to turn round very suddenly.

When he is seated, or lies upon his back, he possesses a considerable degree of power in his legs, for some force is required to extend them when they are flexed, or to flex them when they are extended. When a current of electricity is applied to his legs, the muscles are found to show a fair amount of contractility, and he is not entirely insensible to it. Tactile sensibility is diminished, and so is the sensibility to various irritants, as pinching, pricking with a pin, and heat. This diminution of sensibility is not confined to, although most marked in the legs.

The movements of his arms are also irregular, and this irregularity is very well seen when he attempts to tie or untie his neck-ribbon.

The patient is very much emaciated, but there is no positive wasting of the muscles. Both eyes are excessively prominent; there is divergent strabismus of the right eye, with ptosis of the lid. He sees two images, and is unable to see anything directly in front of him when the left eye is

closed. He has also much trouble in reading. His bowels are obstinately constipated. He expresses his condition by saying that he has insufficient power to expel the fæces; thus showing that he is sensible of their accumulation in the lower part of the rectum. There is no difficulty with the urinary function, the patient being able to retain and to pass his urine.

March 31st, 1864. The treatment at first adopted consisted in the administration of iodide of potassium in ten-grain doses, three times daily, moderate counter-irritation being made at the same time over the spinal column; his bowels were relieved by injections, and the pains in his limbs were moderated by narcotics, which were used both locally and generally.

A symptom of which he complained while in the Hospital was involuntary contraction of the muscles. The treatment adopted brought very little or no improvement, the slight amelioration of his symptoms, which followed his entrance in the Hospital, being as much attributable to the rest and quiet he enjoyed as to the medicine employed. He was, therefore, at the expiration of a month, given a tonic mixture, which contained strychnia.

February, 1865. Williams has returned to his own house, not having received any benefit from the treatment pursued at the Hospital. A decided change for the worse has taken place. He is now almost bedridden, only sitting up in an easy chair while his bed is being made; but he is able still to move his legs about freely while he is lying on his back, and some force is required to prevent him from executing any particular movement. His eyes have become more prominent, and there is increase of the strabismus; the pupils are dilated.

The symptoms of which he complains most are obstinate constipation and the attendant flatulence. He suffers less from the tearing and rending pains in his limbs; there is still, however, diminished tactile sensibility and insensibility to various painful impressions. Sexual desire is still present, and can still be gratified.

In addition to the above, some hysterical symptoms have been developed. Thus the patient will frequently cry out during the night, so as to disturb the whole household. It was, in fact, conduct like the above which caused his dismissal from the Hospital, as he could no longer be retained in justice to the other patients.

November 6th, 1867. This patient died about a year ago, seventeen years after the occurrence of the first derangement of vision; eight years after the loss of co-ordinating power.

This case agrees with those which have been recorded by Duchenne and Trousseau, in the early occurrence of ophthalmic symptoms; and these seem to have preceded the ataxia by at least nine years,—a longer time than is generally found in the reported cases; but as he stated distinctly that he never regained the full use of his eyes, it is scarcely justifiable to set down the affection of his eyes as having nothing to do with the disease.

Case II.—Martin Cope, aged 43 years, a seaman, married, was admitted to the Episcopal Hospital, July 16th, 1864. The following is from notes taken January 3d, 1867:

Previous to the occurrence of his present disease his general health was always good, with the exception of an attack of intermittent fever sixteen years ago, from which he suffered nine months; twenty-five years ago he had gonorrhœa, which yielded readily to treatment. He has been a man of ordinarily temperate habits, but confesses that he has been addicted to venery. The symptoms of his disease were first noticed by him four years ago, and appeared first as a severe pain in the back part of his head, which was very much increased by exposure to cold and wet. Very soon afterwards he found that there was, as he expressed it, slight numbness in his left leg and in both arms, which has continued, in a greater or less degree, up to the present time. About a year after the occurrence of the first symptoms he became obstinately constipated, his bowels never being moved spontaneously, and an evacuation being procured only with

great difficulty. This has also continued up to the present time. A little later, retention of urine occurred, and this also still exists, a catheter being used twice daily to empty the bladder. Two years ago his stomach became very irritable, all his food being vomited for a short time. This, however, was a symptom which disappeared under appropriate remedies, and gave place to the usual sharp, tearing pains in the legs and to a diminution of sensibility, which, however, was most marked in the left leg.

His gait is very staggering; so much so that he has been frequently accused of intoxication while walking in the street. When the patient attempts to walk his feet are thrown forwards irregularly and come suddenly to the floor, so that the motions resemble those made in chorea. He is unable to walk at all, or even to stand steadily, if his attention is called away from his feet, and he loses his balance upon attempting to change his position suddenly. This coincides with an apparently perfect state of the muscles, as these are found capable of acting vigorously and of resisting force applied to them with some effect. Thus he resists any attempt at extension when his limbs are flexed; and the muscles are found to be sensitive and to contract when electricity is applied to them. The tactile sensibility is notably diminished; less pain is also felt than natural when the legs are pinched, pricked, or when heat is applied to them.

Want of co-ordination is also observed in the movements of the arms, but to a very much less extent, and the same remark may be made in regard to their sensibility to various irritants.

The eyes are excessively prominent, and there is divergent strabismus of the right eye, and consequently diplopia. There is slight ptosis of the lid.

The treatment adopted consisted in the administration of one-third of a grain of nitrate of silver three times a day, as recommended by Wunderlich; but, although this remedy was given for two months, no improvement was effected by it. Other medicines were of course employed as they seemed to be indicated.

November 6, 1867. This patient died last year; making the duration of the disease in his case six years.

This case presents some points of difference from the preceding, the impairment of vision not appearing to be here a prominent or an early symptom.

Case III.—During the latter part of the summer of 1863, a soldier, suffering from this disease, was admitted into the Satterlee U. S. A. General Hospital, West Philadelphia.

In his case the disease was of very recent origin, as he seems to have been in good health two months before his entrance into the Hospital, and was attributed by him to exposure to wet and cold, and to sleeping upon the damp ground. Attention was at once attracted by the fact that he watched his feet while walking, and that he went through the motions of walking very irregularly, showing a loss of the co-ordinating power. Staggering was the result of an attempt made by him to walk with his eyes closed, and he almost fell to the floor when he attempted to turn round suddenly.

The tactile sensibility was diminished, and pinching, pricking with a pin, and the application of heat, produced less than the usual irritation. There was no wasting of the muscles, and several of the physicians of the Hospital satisfied themselves that there was very little loss of muscular power.

Condition of eyes, bladder and rectum not noted.

A day or two after admission he was transferred to the U. S. A. Hospital for nervous disease.

In this case the disease was of very recent origin, and the probability of a cure being effected was very great. The assumption of Eisenmann (Canstatt's Jahresbericht, No. 3, 1863), that in the early stages there is only functional disease of the cord, might be here accepted.

The symptoms which are recorded in the three cases here reported are those which are most frequently described; and as it is not the purpose of this paper to give a full account of the course of the disease, the writer will content himself

with discussing only a few of the prominent and peculiar symptoms.

In regard to the ocular disturbances, more recent writers than Duchenne* have not found them to precede the ataxic symptoms; in fact they are now known to occur as frequently either at the same time as the loss of co-ordination, or at a period subsequent to it, or they may even be absent entirely. These ocular disturbances may consist in the loss of visual accommodation, in amblyopia, amaurosis, strabismus, or diplopia; or, at a later stage of the disease, they may result in complete loss of sight. The ophthalmoscope has, of course, shown that the impairment of vision was always accompanied by, and probably depended upon, atrophy of the optic papilla.

The pains that precede the ataxic symptoms are more constant than those which have been discussed above. These pains are generally described by the patients as excessively severe, and are said to be tearing, rending; to resemble the pain which is inflicted when a knife is inserted in the flesh and then *screwed* round, &c. And this may coincide, as has been shown above, with anæsthesia and analgesia. These pains, although to a certain extent premonitory, continue throughout the disease, and are at all times most distressing. They have been attributed generally to congestion or inflammation of the spinal membranes, and are sometimes accompanied by a feeling of constriction around the body, like a girdle,—a symptom which is generally regarded as peculiar to spinal meningitis.

The staggering gait of patients has, of course, attracted much attention, but although the irregular movements made in ataxia are peculiar, they very much resemble those made in a disease characterized by a loss of muscular sensibility or consciousness. In the disease under consideration, the patient will be found to walk unsteadily even when he watches his feet, which is not the case where loss of muscular sensibility alone exists. A symptom dwelt upon by

* Friedreich, Virchow's Archiv., 1863.

Trousseau (Clinique de l'Hôtel Dieu) as of great diagnostic value, has been shown by Clarke (St. George's Hospital Reports, 1866) to occur in diseases of cerebral origin,—the inability to stand with the feet close together is here referred to. The freedom from all derangement of the mind, which has been spoken of as constant, has been found by Clarke and Eisenmann not to be the rule in all cases, and certain it is that Williams's condition bordered very closely upon insanity. It will be recollected that his conduct was so excitable, that the other patients in the ward, and, at a later period, his wife and children, complained of it.

It was natural that symptoms so marked as those occurring in this disease, should awaken the desire to attach them to some constant lesion of the nerve centres. Experiments upon the lower animals and clinical experience teach that the cerebellum cannot be injured or be the seat of morbid change without, as a frequent result, some impairment of muscular co-ordination; it was, therefore, natural for Duchenne to fall into the error of supposing that in all cases of this disease there must be some lesion of this organ. In the only autopsy which Duchenne reports, no alteration in the nerve tissue was found anywhere, although in this case and in all other reported cases in which no disease was found, there appears to have been no minute microscopical examination of the brain and spinal cord made. On the other hand, in all cases where these organs were placed under the microscope, the spinal cord was found to have undergone a peculiar degeneration, and the cerebellum to be rarely diseased. The degeneration of the cord is not always discoverable by the unaided eye, but is generally so. When the alteration is sufficiently far advanced to be detected without the aid of the microscope, the posterior columns are seen to be considerably diminished in size, and if the disease has been of some duration, are very much harder than normal, and have acquired the color and appearance of wet parchment; changes which are due to the excessive production of connective tissue. The posterior roots are also atrophied, and present to a less extent the same

changes as the posterior columns. The membranes immediately covering the degenerated portion of the cord, and in fact, extending a little beyond it, both above and below, are generally inflamed. The microscope shows that the degeneration consists in the excessive production of connective tissue, which by its growth seems to cause atrophy of the true nerve structure. In this connective tissue is imbedded a large number of corpora amylacea and oil globules; the former are found to change to a blue color when iodine and sulphuric acid are applied to them. The less degree of involvement of the posterior roots explains the persistence of the tactile sensibility to the close of the disease. In rare instances, the degeneration may be found to extend to the gray substance and to the lateral columns, but it never invades the anterior roots and columns. The optic nerve is generally atrophied, and this atrophy may extend along the fibres of this nerve up to their origin: other cranial nerves may also be atrophied, but their alteration is by no means a necessary lesion.*

The ocular derangements, occuring, as they do, at the very beginning of this disease, excite the expectation of finding disease at the base of the brain, but it is impossible to conceive that the many experienced observers who have examined the brains of those who have died of this disease, could have failed to recognize its evidences if they really existed there.

There exists, it is believed, but few observations which show an abnormal condition of the base of the brain. Bour-

* The following named physicians have noted changes very similar to those above described: J. Lockhart Clarke (St. George's Hospital Reports), Bourdon (quoted by Eisenmann, Canstatt's Jahresbericht, 3, 1861), Romberg (Sydenham Society, vol. ii, Diseases of the Nervous System; two cases), Eisenmann (Canstatt's Jahresbericht, 3, 1862), Sellier (British and Foreign Medico-Chirurgical Review, January, 1862), Topinard (American Journal of Medical Sciences), Nothnagel (Sydenham Society's Year-Book, 1865 to 1866), Trousseau (Clinique De l'Hôtel Dieu), Friedreich (Virchow's Archiv, 1863), Dumenil, Oulmont and Luys, Charcot and Vulpian, Manotte and Luys, and Carre (quoted by Eisenmann, Canstatt's Jahresbericht, No. 3, 1863), Cruveilhier, Ollivier, and Gull (quoted by Friedreich, Virchow's Archiv, 1863).

don* found "the uppermost of the corpora quadrigemina on the left side more vascular than natural. On slicing the lower part of the brain, the gray substance corresponding to the continuation of the posterior columns of the spinal cord was very vascular throughout. The continuation of the pyramids and the anterior surface of the cerebral peduncles were less firm than they should be." Sellier† found softening of the annular protuberances and of the cerebral and cerebellar peduncles. Topinard‡ found softening of some of the cerebral nerves, and Talichet still more advanced changes, a complete destruction of the crura cerebri, corpora quadrigemina, and the optic tracts. Eisenmann§ in an elaborate paper on this subject expresses strongly the opinion, that the disease at its commencement is essentially functional, and refers to reported cases with all the symptoms of Ataxia, in which recovery took place after the expulsion of worms, and calls attention to the similarity of the symptoms of this disease to those of belladonna poisoning. That the movements of an intoxicated person often resemble those of an ataxic is shown in Case II, the patient having often been accused of drunkenness.

The reports of cases of recovery after a course of calisthenics would also favor this view, as it is impossible to suppose that lesions so marked as those above described could ever be cured by such treatment.

Friedreich on the other hand, believes the disease to be dependent upon spinal meningitis, and says that in the three cases examined by him the changes in the membranes extended higher up and lower down than in the cord.

We are not justified, however, in considering Locomotor Ataxia as advanced to the rank of an "entité morbide," for to constitute this, not only must the same symptons be shown to depend upon a constant lesion, but this lesion must also never coexist during life with a different set of symptoms.

* British and Foreign Medico-Chirurgical Review, January, 1862.
† Ibid.
‡ American Journal of Medical Sciences, July, 1865.
§ Canstatt's Jahresbericht, 3, 1863.

Friedreich reports six cases of nervous disease, three of which died of typhus fever; in none of these cases were all the symptoms of Ataxia present, and on the other hand there were some present which are not usually found, and yet the post-mortem and microscopical examination revealed the same condition of the spinal cord. So too in the same paper, Friedreich* mentions that while atrophy is by no means a constant lesion in fatty degeneration of the muscles, he has occasionally found it as marked as in the cases above referred to.

The fact that this great alteration of the posterior columns might coexist with only slightly diminished tactile sensibility, has, of course, been received with hesitation by those, who were taught that they conducted the sensory impressions up to the brain; and the loss of muscular co-ordination, the cerebellum remaining healthy, has occasioned not less surprise. That injuries or diseases of the cerebellum produce this loss of co-ordination is familiar to every physician. Rather, therefore, than exclude this organ from all share in this function, as some have seemed disposed to do, it would be preferable to accept, as Eisenmann does, some such relationship for the posterior columns to the cerebellum as exists between the anterior columns and the cerebrum; just as the brain is the organ in which the voluntary movements originate, and the anterior columns serve as conductors to the nerves which supply the various muscles, so may co-ordination be supposed to take its origin in the cerebellum, and be conducted through the posterior columns.

Injury to or disease of the posterior columns as well as of the cerebellum will be most probably followed by loss of muscular co-ordination, but that a morbid state of this portion of the spinal cord may sometimes fail to give rise to this symptom, may be inferred from the fact, that tumors and abscesses in the cerebellum have in many instances given no manifestation of their presence. In some cases the loss of muscular co-ordination may be of cerebellar origin,

* Virchow's Archiv, 1863.

in some of spinal origin; just as the cause of paralysis of motion may be sometimes seated in the brain, and sometimes in the anterior columns.

*Causes.*—In regard to a knowledge of the causes of this disease, little advance appears to have been made. Secondary syphilis, onanism, excess of venery, exposure to wet and cold, have all been assigned in different cases as exciting or predisposing causes; but in many cases an exciting cause will be sought for in vain. In Case III, exposure to wet and cold, and sleeping upon the damp ground, seemed to have much to do with calling the disease into existence. Trousseau believed that there was an hereditary tendency to this disease, just as there is to many other nervous diseases, of which epilepsy may be cited as an example. And if the cases reported by Friedreich be considered as examples of Ataxia, we have almost convincing proof of the truth of this assertion, as the six cases all belonged to two families. The fact that the father of four of the patients was a confirmed drunkard, and was believed by his wife to have begotten the children when intoxicated, is of no little interest.

Lying upon cold, damp ground, is of course known to be a frequent cause of spinal meningitis; but why in some instances the meningitis should give rise to this peculiar degeneration of the cord, it is as yet impossible to discover.

*Treatment.*—As cures have sometimes been effected, and the intolerable pain may always be alleviated, the treatment of this disease should at all times receive due attention.

Cold water, in the form of the douche, has been of service in the hands of Prof. Tessier, Drs. Bourguignon and Eisenmann. Electricity, whether in the form of the continuous or interrupted current, has appeared to be of very little use, although very much lauded by Duchenne and Dr. Cyon.*

Calisthenics are said by Eulenburg, in two cases of recent origin, to have produced a cure, and by Ulrich to have produced great improvement in two cases.

Iodide of potassium has of course been recommended in

* Schmidt, Jahrbücher, Band cxxxiv, 1867, No. 4.

cases suspected of having a syphilitic origin; but recent writers do not speak favorably of its action; and in Case I its use was certainly not followed by satisfactory results.

Wunderlich* has claimed great success for the nitrate of silver, which he has used in fourteen cases. In some cases a cure was effected, and in all a very great improvement. His example was imitated by Charcot and Vulpian, Duguet, Vidal, and Herschell.

The case recorded by Herschell† is of unusual interest. The use of the nitrate of silver is attended with some inconveniences. Thus in some patients it occasions vertigo; in others irritation of the bladder and rectum. The oxide and phosphuret have, therefore, been proposed as substitutes. By the advice of Eisenmann, Klinger gave the phosphuret with so much advantage that the patient, a woman, was enabled to dispense with her cane, which had previously been necessary. Although the nitrate of silver was used unsuccessfully in Case II, the testimony in its favor is so great that its use in moderate doses would be justifiable; but the possibility of adding a discolored skin to the other misfortunes of the patient should be always remembered.

Opium, or some other narcotic, may be used to alleviate the intense pain which the patient so frequently suffers. Where this fails to relieve him, hyoscyamus or belladonna may be tried. In some cases, where medicines by the mouth have failed, anodyne liniments have been successful. It is scarcely necessary to add that the patient's general health should be improved by the administration of tonics and by the use of good diet.

* Canstatt's Jahresbericht, No. 3, 1862, quoted by Eisenmann.

† Quoted by Eisenmann, Jahresbericht, 3, 1863. In this case the patient was ataxic to a great extent; had lost tactile sensibility; was impotent; suffered from the tearing pains; and was unable to read even large print. The nitrate of silver effected so much improvement that he no longer staggered when his eyes were closed, the impotence ceased, and he was able to read much finer print.

# POISONING FROM ATROPIA,

## TREATED BY OPIUM.—SUBSEQUENT RECOVERY.

By D. H. AGNEW, M.D.

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Margaret G——, an Irishwoman, aged 43 years, was admitted into the Hospital for cataract of both eyes. The lens had been extracted from the left eye, and she was making an excellent recovery. Twelve days after the operation, a short time before her bedtime, she complained to the nurse having charge of the ward, of severe supra-orbital pain, which, continuing persistent, the latter concluded would be best relieved by the exhibition of a solution of morphia, kept in the ward for similar cases. Taking down the bottle which she supposed contained the morphia, one large tablespoonful was administered. Immediately on swallowing the liquid the patient complained of intense bitterness and a feeling of unusual constriction about the throat. After the lapse of eight or ten minutes she became restless, attempted to get out of bed, and talked incoherently. The nurse now became alarmed and summoned the resident physician, who, after witnessing the singular demonstrations of the patient, inquired at once for the bottle from which the supposed anodyne had been taken. The serious nature of the case was soon revealed, when it was discovered to be the bottle containing a solution of the sulphate of atropia, and which was used as a daily local application to the eye. The strength of the solution was three grains to the ounce of menstruum. She had therefore taken one grain and a half of the alkaloid. I was immediately sent for, and reached the Hospital about three-quarters of an hour after the occurrence. At this time, 10 o'clock, she was struggling to rise from the bed, tossing

the arms about wildly; unable to articulate, and the voice like one suffering from croup. The secretions from the tongue, pharynx, and lachrymal glands were completely suspended, and the pupils widely dilated. It was too late to administer an emetic. Eighty drops of the tincture of opium were immediately given, and swallowed with difficulty, after being conveyed far back into the fauces, and were followed very soon by a quantity of lemon-juice.

The following notes, taken at the time by the resident physician, Dr. Campbell, who watched the patient with great care, will exhibit the progress of the case:

| | Pulse. | Respiration. | Treatment. |
|---|---|---|---|
| 11 o'clock P. M., | 100 | 30 | Tinct. opii, gtts. xxx; lemonade. |
| 11½ " " | 116 | 28 | Tinct. opii, gtts. xx. |
| 12 midnight, | 130 | 24 | Aroused with difficulty. |
| 12½ o'clock A. M., | 120 | 22 | Lemon-juice. |
| 1 " " | 120 | 20 | |
| 1½ " " | 112 | 20 | Tinct. opii, gtts. xx. |
| 2 " " | 108 | 20 | Lemon-juice. |
| 3 " " | 112 | 22 | Tinct. opii, gtts. x. |
| 4 " " | 102 | 19 | Tinct. opii, gtts. xx. |
| 5 " " | 100 | 19 | Tongue getting moist. |
| 6 " " | 100 | 21 | Less stupor. |
| 7 " " | 120 | 22 | Tinct. opii, gtts. x. |
| 8 " " | 112 | 20 | Lemonade; swallows better. |
| 12 " M., | 108 | 19 | Tinct. opii, gtts. x. |
| 4 " P. M., | 104 | 20 | Swallows better. |
| 7 " " | 96 | 18 | Answers when spoken to; beef tea ordered. |
| 9 " " | 84 | 19 | |

From this period forward her improvement was uninterrupted, and by the following morning she was quite rational, with good voice and absence of all unpleasant feelings. No gastric irritation either attended or followed the poison. The treatment extended over a period of eighteen hours, during which time she took two hundred drops of the tincture of opium. The pulse was greatly accelerated, and was most frequent (130) at the time of greatest insensibility. With an occasional exception, the diminution in both the frequency of the pulse and respiration kept pace with the amelioration of the symptoms.

# BRIEF NOTE ON FRACTURE

OF THE

# ACROMION PROCESS OF THE SCAPULA.

By A. D. HALL, M.D.,

ONE OF THE SURGEONS TO WILLS' HOSPITAL; FORMERLY RESIDENT PHYSICIAN AT THE PENNSYLVANIA HOSPITAL.

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In November, 1865, the writer was requested to visit Mrs. J——, who had fallen down stairs, and was said to have broken her shoulder. She was a fleshy, heavily built lady, over 60 years of age. The blow must have been a very severe one, as she was still suffering from the shock of the injury after the lapse of a considerable interval. The top of the left shoulder was much ecchymosed, and the first impression conveyed was, that it was a fracture of the head of the humerus, with displacement of the fragments. There was flattening of the shoulder and an apparent depression at the head of the humerus. There was also an absence of the rounded contour of the shoulder very evident on comparison with that of the opposite side. On rotating the arm crepitus was obtained at the point of the shoulder, but upon a careful examination no fracture of the humerus could be detected.

On running the hand along the spine of the scapula there seemed to be a greater space between the acromion and the head of the humerus than was normal, and on making pressure a hollow was found at this spot.

The following measurements, made at the time, will show the relative difference between the sound and injured arm:

*Sound Arm.*

From the acromion to the external condyle of the humerus, . 12 inches.

*Injured Arm.*

From the end of the upper fragment of the acromion to the external condyle of the humerus, . . . . . 13½ inches.

From this it would appear that one and a half inches of the process was broken off and displaced downward.

The locality in which the blow was received, the site of pain, crepitus at the point of the shoulder, depression at the extremity of the spine of the scapula, and finally, the measurements as given above, established the diagnosis of a fracture of the acromion.

Velpeau's bandage for fracture of the scapula was applied, and retained for four weeks, mainly with the object of keeping the head of the humerus well up under the fragment, so as to act as a splint to the fractured bone. At the end of five weeks the patient could put the hand of the injured side behind her head, although there was still a sense of soreness and weakness, and a sensible depression at the site of injury. After the lapse of nearly two years the patient was carefully examined. The motion of the shoulder-joint was perfect in every direction. The breadth of the injured shoulder appeared to be less than that of the opposite side, and a depression at the point of the shoulder could still be detected on firm pressure being made.

But one case of this fracture came under the writer's notice during eighteen months' residence in the Pennsylvania Hospital. It occurred in the person of a man aged 32, who had been pushed from a dray, striking his left shoulder upon the curb-stone.

There was some contusion, but no displacement. But the observation of this case is rendered incomplete, as the man, probably tired of the confinement of hospital life, left in five days.

In November, 1858, the writer presented to the Pathological Society of Philadelphia a scapula illustrating an ancient injury of this character.

In the course of a post-mortem upon an elderly man, who

had died of malignant disease of the stomach, it was observed that the right humerus had been disarticulated at the shoulder. This excited attention, and led to the removal and examination of the scapula and clavicle. It was found that the acromion process, for one and a quarter inches, was broken off, and displaced downward and forward in the glenoid cavity. The articulation of the fragment with the clavicle was not disturbed.

There had been no attempt at bony union, the fractured fragment being merely bound down to the glenoid cavity by a dense ligamentous structure. From inquiries made of the family, it was ascertained that the man had received some obscure injury of the shoulder years before the period of amputation.*

Cases of fracture of the acromion have been reported by numerous authorities, and yet Sir W. Fergusson speaks of it as "of rare occurrence."† This difference of opinion is owing to the fact that in many of the recorded cases what was supposed to be a true fracture was, in reality, a separation of the epiphysis.

Boyer's remark, that a slight deformity need not compromise the motion or usefulness of the arm,‡ was well borne out in the result of the case reported in the beginning of this article, in which, although there was considerable displacement, it in no wise interfered with the mobility of the joint.

In conclusion, the degree of deformity resulting from this fracture must depend upon the extent of laceration of the periosteum surrounding the fragments. This fact is beautifully illustrated by a case of Stephen Smith's, quoted by Hamilton, in which "an autopsy, made three weeks after the accident, showed a fracture without displacement; the periosteum covering its upper surface not being torn, the fragment could be turned back as upon a hinge."§

* Proceedings of the Pathological Society of Philadelphia, vol. i, 1860, p. 184.

† Hamilton, Fractures and Dislocations, Philadelphia, 1860, p. 211.

‡ Malgaigne, Treatise on Fractures; Packard's translation, p. 410.

§ Hamilton, p. 211.

# A CASE

OF

# RETROVERSION OF THE UTERUS,

## THE POSTERIOR WALL OF WHICH WAS THE SEAT OF A LARGE MURAL FIBROUS TUMOR.

By GEORGE PEPPER, M.D.

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The following case, although but an isolated instance of a complication occurring in the history of fibrous tumors of the uterus, from its very positive character seems worthy of being placed on record.

Catharine Griffen, æt. 50, widow, a native of Ireland, but having lived many years in America, came under observation, January 10th, 1867. Two years previously she had been under treatment for obstinate intermittent fever; this was finally overcome, and she regained her usual health. She enjoyed almost uniform good health until the age of 45, when her menses became more frequent and profuse, and for two years she suffered from violent metrorrhagia, amounting at times to exhausting flooding. During this time she grew enfeebled, and since the cessation of the catamenia, now three years ago, has only partially regained her previous health.

She was married when almost thirty years of age, and had but one child, now a strong, well-grown girl of eighteen. The labor was a difficult one; and she never conceived again. Her hair became almost silvery white at quite an early age.

About eighteen months ago, she began to suffer with procidentia uteri. At first the protruding mass was quite small, and when she assumed the recumbent posture, would imme-

diately re-enter her person, although the least movement would again cause its extrusion. At this time, she also began to suffer from vesical irritation. The uterus steadily increased in size until the protruding portion was as large as two fists; it still remained out of her person during the day, though returning at night.

There have been but two inconsiderable hemorrhages during the past two years; lately the procidentia has not disappeared so completely during the night; she has suffered with painful dragging sensations, and her micturition has been constant and annoying. In addition to this, she has been employed as a domestic in a large boarding-house, and has overtasked her strength.

She states that she has noticed for the past year or more, an increase in the size of the lower part of the abdomen, and believes that there has been a "hardness" developing over the uterine region. About one year ago, also, she suffered with colicky pains for a few days, though no connection was suspected with the uterus.

December 29th, 1866. After a hard day's work, she took a very hot foot-bath and retired to bed, when the uterus, which had been protruding all day, fell back into the vagina, and went up far more than it had done for eighteen months. She was immediately seized with griping, bearing-down pains, and found herself utterly unable to pass her water, which, however, dribbled away from her when she was lying upon her back. The desire for micturition was constant, but upon rising to empty the bladder, she invariably found that though she was able to make powerful expulsive efforts, yet she could not relieve herself in the least.

This condition of affairs continued until January 10th, 1867, at which time I first saw the case. She suffered constantly with colicky pains in the abdomen, and obstinate constipation with gradually increasing distension of the abdomen, which was slightly relieved by the large and repeated doses of castor oil, which she had taken, and which brought away small passages attended with painful straining. Her inability to pass water persisted, and it was only by lying

upon her back that any urine could be expelled; in this position indeed it constantly dribbled from her. There was total anorexia, with frequent nausea, and for the last day or two, occasional vomiting. Her forces were evidently rapidly failing, the pulse feeble and small, surface rather warm, tongue dryish. Upon introducing a catheter, a very large amount of highly ammoniacal but otherwise healthy urine was drawn off; the bladder was evidently forced upwards and forwards. Upon making a rectal and vaginal examination, a dense, resisting mass, apparently of firm fibrous tissue, about the size of the fœtal head, was immediately detected. This mass was spheroidal in shape, with a few slight bosselations, and occupied the recto-vaginal pouch, which of course, was enormously distended, as the mass completely filled the pelvic cavity. The rectum and vagina were very much distended, but there appeared to be no disease of their walls, nor did the tumor appear to have contracted any strong adhesions with them, as both walls were quite freely movable over its surface.

The os uteri could not be reached over the rounded mass which encroached so much upon the vagina. There was œdema of both legs, from the hips downwards, and the right labium minus was extremely œdematous, hard, resisting, and prominent.

A laxative was ordered, so as to secure free action of the bowels, and on January 12th it operated, though scantily. Her suffering from distension of the abdomen and inability to pass urine, were now so great, that it was determined to make an effort to force the tumor upwards out of the pelvic cavity.

The diagnosis being clearly established of the impaction in the pelvis of a uterine tumor, complete anæsthesia was induced, and after the bladder had been thoroughly evacuated, a large colpeurynter was introduced into the vagina and subsequently into the rectum, and forcibly distended with water; the only effect of this, however, was to greatly dilate the lower portion of the vagina and rectum, paralyzing the sphincters, and apparently to elevate the mass very slightly, though even this was doubtful.

After a number of unsuccessful efforts the colpeurynter was abandoned, and the patient placed on her chest and knees. After having introduced several fingers of one hand into the rectum, and of the other into the vagina, the posterior portion of the mass was pushed upwards with great force, while, with the fingers forced between the anterior part of the tumor and the symphysis, and aided by external manipulations, the anterior portion was both pushed and drawn downwards. By the prolonged use of this combined action the mass was slowly dislodged, the most dependent part, in reality the posterior face of the fundus of the uterus, slowly passed along the curve of the sacrum, and the os could be detected above the symphysis. It was now evident that the morbid growth involved the entire posterior wall of the uterus from the cervix to the fundus, the posterior segment of the organ forming almost a hemisphere. The cervix was but little above the normal size, of healthy consistence; the os was transverse and not at all patulous; the uterine sound entered several inches; when the uterus was restored to its proper position, it was so much elevated that it was not possible to reach the os with a single finger in the vagina.

A colpeurynter was now introduced into the vagina and fully distended, and secured by means of a T-bandage. A suppository consisting of opium grs. j, and tannic acid grs. x, was introduced into the vagina; and one containing opium grs. j, into the rectum. In addition to this, she had a hot hop poultice to the abdomen, and took f℥ij of solution of sulphate of morphia.

In the evening of the same day, the colpeurynter was removed, the bladder emptied, and the colpeurynter replaced. The dose of morphia was repeated.

She had passed a reasonably comfortable day; the abdomen was distended and somewhat sensitive; her skin was but moderately hot; her pulse about 90 and quiet; and her tongue merely dryish; she was, however, extremely hysteroidal.

The following morning her condition was improved; she

had slept several hours, was more free from abdominal pain, though there was still great distension of the abdomen. The colpeurynter was removed, the bladder emptied, and a glass ball pessary, about one and a quarter inches in diameter, introduced. The uterus exhibited no tendency to descend into the cavity of the pelvis. A suppository of opium gr. j, and tannic acid grs. v, was introduced into the rectum, and a full dose of castor oil administered.

After the introduction of the pessary, her unpleasant sensations rapidly subsided. Towards night she had a large stool, without any straining or difficulty, and passed urine freely several times during the day. Her extreme nervousness had somewhat diminished.

She was placed upon the use of Basham's iron mixture, pills of comp. extract of colocynth to regulate the action of her bowels, and was directed to use a nutritious, supporting diet. All abdominal tenderness soon vanished, and two or three days after the operation, the entire uterine tumor could be grasped above the symphysis pubis; the fundus reached nearly to the umbilicus; the organ appeared pyriform in shape. The œdema of the legs and the right labium disappeared within forty-eight hours after the restoration.

February 1st, 1867. More than two weeks after the operation, she expresses herself as more free from vesical trouble than she has been for the past year. Bowels are regular, strength and appetite returning; she has a small umbilical hernia. The uterus was felt distinctly, hard, and apparently about the size of the fœtal head, reaching to within two inches of the umbilicus. The pessary still remained in position and was removed; the os uteri could not be reached, being high up in the pelvis. No sensitiveness whatever remained.

Retroversion and impaction in the pelvis of the uterus, whether in the gravid condition, or from the existence of subinvolution, is of comparatively common occurrence, but in searching medical literature for examples of accidents similar to the above, I have been unable so far as my researches have extended to find a full account of a single well-marked case.

Most writers do not indeed even allude to the possibility of such an accident, whilst others merely state that it may occasionally occur. Hewitt, in his work on Diseases of Women, gives the following short notice of it: "Retroversion of the uterus with a fibrous tumor or tumors, growing from the posterior wall, suddenly occurred in a patient who came under my notice, with enormous distension of the urinary bladder." No mention whatever is made as to the cause, result, or the treatment adopted, and yet this, unsatisfactory and incomplete as it is, is the most extended allusion I have been able to find.

According to Bayle, every fifth woman dying after the age of thirty-five is found to have fibrous tumor of the uterus; and other statistics, although they may not point to so large a proportion, still prove that fibrous tumor is generally regarded, and probably justly, as the most frequent organic disease of the uterus. And the facts, that the posterior wall of the organ is the most usual seat of the growths, and that when small they are common determining causes of retroversion, argue that this accident must occur more frequently than medical literature would seem to indicate.

The points of the above case best worthy of consideration appear to be the correct diagnosis based upon the previous history and the physical signs; the sudden manner of occurrence; the treatment instituted, and the relief instantly following; and the entire absence of any unfavorable symptoms caused by the necessary violence. It is also interesting to observe the fact, that before the accident procidentia always showed itself when the erect position was assumed, whereas, after this mass was forced above the superior strait of the pelvis, no tendency was observed to a return of the displacement.

The history of the case is clearly that of fibrous tumor of the uterus. Thus the age of the patient, the absence of severe pain or excessive discharge, the perfect performance of the various functions until the accident, the gradual supervention of the various symptoms, the metrorrhagia before the final cessation of the catamenia, and then, as the tumor en-

larged, the occurrence of procidentia uteri, slight at first, but gradually increasing, the dragging sensations experienced in the loins and hypogastric region, the frequent and often painful micturition, and the progressive enlargement of the abdomen, point almost unmistakably to this affection.

The above symptoms, taken in connection with the physical signs, the hard, globular mass, filling so completely the pelvic cavity, the impossibility of reaching the cervix anteriorly, the tense anterior wall of the vagina, and the abdominal tumor felt above the pubis, pointed apparently to one of two conditions,—either the elevation of the uterus, and the impaction of a large pediculated fibrous tumor in the basin of the pelvis, or the retroversion of a uterus the body of which was the seat of fibrous disease.

The mode in which the retroversion occurred differs from similar accidents taking place in the course of pregnancy, from the fact that it was not either the gradual growth of a permanently retroverted organ, nor the result of a sudden displacement from the normal position by violence or exertion, but that the accident happened to a uterus freely movable through the pelvic cavity, as was shown by the occurrence of procidentia and the return of the mass within the vulva when the patient assumed the recumbent position.

The satisfactory explanation of such an occurrence is certainly difficult; but no doubt the great weight of the fundus of the uterus, and possibly the traction exercised by a distended bladder, aided by the complete relaxation induced by excessive fatigue and the hot foot-bath, were the determining causes. It is also probable that the neglect of the proper measures during the first few days succeeding the accident, before the congestion and tumefaction of all the parts concerned had taken place, and before the accumulation of fæces and urine above the impacted mass, rendered the displacement permanent and the restoration of the organ so difficult.

The general character of treatment pursued was that most commonly resorted to in retroversion of the gravid uterus, modified, however, by the great urgency of the case,

the impossibility of diminishing the growth by operation, and the absence of the necessity for the consideration of another life. It consisted mainly in taking advantage of the relaxing effects of complete anæsthesia, and in securing, by the position of the patient, the assistance of gravitation, aided first by the elevating power of a colpeurynter, and finally by both external and internal manipulations.

The principal danger to be apprehended was, that displacement and pressure, continued for such a length of time, had produced peritoneal inflammation; and that any attempt to forcibly restore the organ to position would have a tendency to increase the irritation or rupture any adhesions that might have formed. Fortunately, however, although a greater amount of force than had been anticipated was necessary to force up the fundus, and draw down the cervix, no unfavorable symptoms followed; but, on the contrary, the greatest relief was experienced so soon as the mass was above the superior strait.

The after-treatment was adopted with the view of producing free action of the bowels and of preventing tenesmus, as well as of allaying pain and relieving the hysteroid condition. Astringents were also employed to favor the contraction of the dilated vagina and rectum, and, with the mechanical means, to retain the uterus high up in the pelvis, until such time as the natural supports should be able to aid.

The last point for consideration is the fact that the tumor remained above the superior strait after the accident, while before its occurrence, as we have seen, it moved readily through the pelvic cavity. The cause of this sudden fixation was probably the increased growth of the mass, caused by the stimulus due to the impaction and the manipulations necessary to release it. Unfortunately it has been impossible fully to investigate the subsequent condition of the patient; but this much is known, that the abdomen is more enlarged than formerly, and that she has had no serious trouble since her accident. She has, however, attended to her household duties, and has enjoyed tolerably good health.

# HEAT FEVER. (SUNSTROKE.)

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It is proposed in this paper, briefly to consider some facts connected with the pathology of sunstroke, as illustrated by the cases reported, to consider its nosological classification, and to offer a few words in regard to its treatment.

So far as the writer is concerned, the published observations of others on this subject have been fully acknowledged by him elsewhere (see papers on Sunstroke, American Journal of Medical Sciences, October, 1858, and January, 1859), and they will be referred to here only as they serve to elucidate some especial fact under consideration. It seems necessary, however, for the proper understanding of the subject, to bear in mind, that two or more pathological conditions, very distinct in their phenomena, if not in their nature, are often spoken of indiscriminately as insolation or sunstroke. The first of these, is the simple loss of power, which results from undue exertion during the extreme heat of summer. It occurs alike in the open air under the almost vertical rays of the sun, and in the close and heated atmosphere of the laundry, the sugar refinery, and the crowded barrack. Its phenomena show themselves in a feeble and moderately frequent pulse, a moist skin, the head generally hotter than the trunk, with little or no alteration of the pupil, and a tendency to syncope on the slightest exertion. Such was the character of several cases of sunstroke treated in this Hospital during the months of June and July, 1858, and re-

ported as above. The symptoms are those which denote chiefly loss of power; they have their starting-point probably in the nervous system, and involve the muscular function later in their course. These cases present no obvious structural change in the blood or in the solids; they prove fatal only from want of prompt attention, from undue exertion on the part of the patient, or from injudicious interference on that of the physician. They imperatively demand rest, the supine position, and the free use of stimulants, such as alcohol, ammonia, or turpentine, and these are often most effectively administered by the rectum. Cold affusion, or cold in any form, if used in these cases, is best applied to the head alone, and its employment requires the exercise of much caution and judgment.

There is another result of exposure to heat, which is, however, less frequently described as insolation. It occurs to cooks, workers in foundries, and to other artisans whose business compels a prolonged exposure to a high temperature. It is gradual in its approach; it shows itself in the form of headache, suffusion of the eyes, intolerance of light, contraction of the pupil, a hard and excited pulse, vomiting, sooner or later delirium, convulsions, paralysis, and death. In other words, it is inflammation of the brain, meningitis, or cerebritis. The student investigating the cause of this affection will find it in the undue and prolonged influence of heat; but surely it were an unnecessary refinement to give this disease a classification separate from meningitis.

There is, however, a form of insolation or sunstroke, which if not its most frequent, is certainly its gravest manifestation. It comes on suddenly, or with but the very slightest premonition, such as giddiness, a confused blending of colors, and a severe pain in the head. These phenomena are speedily followed by unconsciousness, stertorous respiration, jactitation, in many instances by convulsions and death. It is attended with a pungently hot skin, a temperature ranging, as noted by the thermometer, from 104° F. to 112° F., and a pulse so frequent that it cannot be counted. If proving fatal, it generally does so within six hours from the time of

seizure. Its victims are the young, the robust, and the unacclimated. This form of the disease, like the first, may be developed by the direct rays of the sun, or may occur in the heated air of the workshop. It has as its most obvious, and as the writer believes, its constant and essential pathological phenomenon, an altered state of the blood. This fluid has lost its property of coagulating, is less alkaline than it is in health, and under the microscope, the red corpuscles are found to be shrivelled and crenated. It is well illustrated by the following case:

Patrick Regan, aged about 25 years, was admitted into Pennsylvania Hospital July 6th, 1867. He had been employed in a lumber yard, near Third and German Streets. Had always been a strong, healthy man; had been but five weeks in America, and was of temperate habits. He was perfectly well on the morning of the 6th, ate a hearty dinner at noon, and returned to his work. At about 3 P.M. he called to one of his fellow-workmen, saying he would have to quit work, and complained of headache. He started to go to his home, a distance of less than half a mile, but fell in the street before he had reached it. He was carried there, and a physician called who ordered ice and wet cloths to be applied to his head. Beyond this it could not be found that any treatment had been instituted. He was brought to the Hospital at 6½ P.M., in a comatose and apparently moribund condition; the pulse so frequent that it could not be counted; the breathing stertorous; the chest filled with coarse râles. The temperature in the axilla was 105½°, and there was great and pungent heat along the entire course of the spine and its vicinity. The extremities, on the contrary, were cold. He was stripped of his clothing, placed on a bed, and his head surrounded with large lumps of ice, and his body rubbed with the same material. Attempts were made to administer whiskey and ammonia, but he could not swallow. Recourse was had to the rectum, but with as little success, as no sooner was the injection-pipe withdrawn than the contents of the rectum were ejected. There was no involuntary evacuation of the bladder. The man continued

unconscious; his pulse became progressively less, until it disappeared entirely at the wrist. At about 8 P.M. several dry cups and one cut cup were applied to the neck, without producing any change in his condition. At 8.20 P.M. the pupil of the left eye began to dilate; a little later the right pupil began to dilate also, and by 8.30 P.M. both pupils were widely dilated. Respiration became more irregular and feeble; the lower jaw relaxed; the eyes turned upwards and became glazed; and at 8.40 P.M. death occurred.*

The post-mortem examination was made, under the superintendence of the writer, on the following morning, thirteen hours after death. Present: Drs. Markoe, Hare, Norris, and Müller. The body was that of a very large, muscular man. *Rigor mortis* well marked. *Exterior:* The face was of a dark purple hue; bloody, frothy mucus was escaping from the mouth, and the lower lip was of a black color. The whole exterior of the body was purple, with here and there darker ecchymotic patches. *Head:* When the scalp was cut through, dark liquid blood escaped. On removing the calvaria the vessels of the dura mater were found full of dark liquid blood, which was easily pushed along by the handle of the scalpel. The brain was softened, breaking down with its own weight, or by the slightest pressure. When thus broken myriads of minute dull-red points were to be seen. The plexus choroides was of a dark-purple hue. There was no effusion in the ventricles. On the under surface of the brain there was a little uncoagulated blood. The arteries at the base of the brain were empty and their coats free from disease. *Thorax:* There was much fluid blood noticed on raising the sternum. The anterior surface of the lungs presented an appearance nearly natural, though of somewhat darker hue. Posteriorly these were of a blackish color, and when incised were filled with a liquid very like dark-colored treacle, which slowly oozed from them. In other places this was a little firmer, resembling the interior of a softened spleen; in other parts they

* Owing to a temporary absence from the city, the writer did not arrive at the Hospital until after the death of this patient. The history of the case is from notes kindly furnished him by Dr. Markoe, resident physician.

were œdematous. The heart was of the usual size, rather above than below it, with about the usual quantity of fat upon it. Its whole exterior infra-pericardial surface was dotted with minute petechiæ, even including the surface of the auricular appendage. The wall of the left ventricle was about half an inch in thickness, and though when opened it could be easily torn, yet it firmly resisted the effort to force the thumb through it; in other words, was not noticeably softened. All the valves were free from organic disease, but the curtains of these and the whole endocardial structure were dotted with small blood stains. In the left ventricle, beneath the endocardium, apparently among the smaller muscular fibres, there was a bluish-black wedge-shaped stain, as if of imperfectly coagulated blood. A similar color stained the tricuspid curtains. For the most part the right side of the heart was pale. The inner coats of the aorta were of a cherry or a light brick color; the pulmonary artery was stained, but paler than the aorta. *Abdomen:* The liver appeared to be free from disease, but was full of liquid blood, which poured from it, when pressed, like water from a saturated sponge. The kidneys were of a faint purple hue, especially marked at their periphery. The capsule came off entire, and in the surface of the gland, thus denuded, the minute vessels, beautifully injected with blood, were distinctly seen. The spleen was of the usual size, and of very nearly the usual consistence.

Under the microscope, the blood was found to exhibit one or two rouleaux, with patches of irregularly-arranged, shrivelled, crenated corpuscles. Its reaction was faintly alkaline.

The post-mortem appearances in this case were so identical with those of a fatal case of spotted or petechial fever, made in the same dead-house a short time before, that it would have been impossible, had the two bodies been side by side, without some personal knowledge of them, to have distinguished one from the other.*

* Andral, in his Clinique Médicale, gives the following as the post-mortem appearances in a case of sudden death in the harvest-field, when the thermometer was at 40° Reaumur (122° F.), in the sun:

"This was a stranger, a woman between 48 and 50 years of age. All the

A careful consideration of the subject, as indicated by this and analogous cases, has left the writer no alternative but to adopt the name of *heat fever* as most accurately denoting the symptoms and pathology of this form of insolation.

That it is a febrile affection, all its phenomena, both before and after death, clearly indicate. Doubtless it will be suggested that as the word fever (*febris*) implies warmth, this name is essentially tautological. Such an objection, however, is hypercritical. Whatever meaning may have originally attached to the word, it certainly now signifies much more than its mere etymology indicates, and designates a morbid condition of the whole system, of which heat is far from being the only manifestation. And yet there is, perhaps, no disease in which the temperature acquires such a wonderful elevation as in this. It is, however, with reference both to its causation and to its phenomena that the name of heat fever has been given to it. That it is a derangement of the whole economy explains the conflicting statements of those pathologists who have attempted to find its peculiar lesion in one organ alone, as in the brain, or the lungs, or in the heart.

This view of the resemblance of the phenomena of sunstroke to those of an idiopathic fever, taking typhus fever as an illustration of the latter, was first publicly announced, so far as he is aware, by the writer of this paper, in an essay

articulations were rigid; the back was traversed by blue spots; almost the entire face was covered with them; the face, from the chin to the nose, was absolutely livid; several were also to be seen on the chest, the size of which varied from that of a lentil to that of a twenty-sous piece. These spots had precisely the appearance of petechiæ, and yielded, when cut into, some liquid blood. The body was still warm, but exhaled a fetid odor; the abdomen was tympanitic; the integuments and bones of the cranium presented nothing extraordinary; their vessels, as well as those of the brain, contained some liquid blood; the cerebral substance was extraordinarily softened; the lateral ventricles contained a bloody serum. The pericardium presented a slightly inflammatory tint on its inner surface; the right ventricle of the heart contained a little black liquid blood; the blood of the left ventricle was red and frothy. (See Medical Clinic or Reports of Cases, by G. Andral, Professor, &c., Bell's Medical Library, vol. vii, p. 199; translated by D. Spillan, M.D.)

on "Sunstroke," published in the American Journal Med. Sciences, January, 1859, p. 50. It is expressed in the following words: "No intelligent medical observer can witness or read of these phenomena without being struck with their resemblance (I had almost said their identity) to those presented in deaths from typhus fever. This will be the more apparent if we take one of our standard authorities and compare his description of the pathological appearances of typhus with those of sunstroke.

| Post-Mortem Appearances in Typhus Fever. | Post-Mortem Appearances in Sunstroke. |
|---|---|
| A strong tendency to speedy putrefaction.—Wood. | Speedy decomposition after death.—Dowler. |
| Petechial eruption a characteristic lesion.—Wood. | Face and neck covered with livid spots.—Dowler. |
| | Petechiæ.—Andral. |
| Blood found in the veins liquid; coagula rare. Within the cranium there is often venous congestion, with some effusion in the ventricles or beneath the arachnoid; and the substance of the brain is occasionally darker than in health, though in other cases unaltered or even whiter. No clearly-ascertained connection exists between the stupor and the anatomical appearance in the brain.—Wood. | Slight congestion, such as occurs in other acute disease; no organic disease of the brain.—Gerhard.<br>Brain healthy; a very small quantity of serous effusion in some cases; venous congestion; brain healthy; substance soft.—Andral.<br>In a case of stupor and delirium no lesion of the brain found.—Swift. |
| The posterior and lower part of the lungs is often solidified; of a dark-red color, fragile and impervious to air, though without the granular appearance of hepatization.—Wood. | Lungs dark, and injected with blood, the central and posterior parts presenting the appearance of an enormous clot of blood, somewhat solid, and united by a texture bearing no resemblance to the elastic, contractile texture of healthy lung.—Dowler. |
| The heart sometimes natural, sometimes softened, sometimes containing liquid blood.—Wood. | Heart natural.—Lente.<br>Heart soft.—Pepper.<br>Heart filled with liquid blood.—Andral et al. |

"And so, too, with the incidental lesions of other viscera. If we carry our investigations further back we shall find an

astonishing identity in the symptoms presented during life. Each has a frequent and feeble pulse; each may or may not have a hot, pungent skin; each has its stupor, deepening into coma; each its suffusion of face and eyes, its lividity of countenance, and we need but use words given as descriptive of typhus if we would describe some of the phenomena of sunstroke. 'Now and then great restlessness and jactitation occur, with twitching in various parts of the body.'"

This idea was, however, but a natural consequence of the clinical teachings of this Hospital for the past twenty years. During all this time Dr. Gerhard has taught that the essential pathology of this disease was to be found in an altered blood. The same opinion was held and taught by the late Dr. Pepper, and, following them, by the writer. It was but a step further to notice the resemblance of the phenomena to those of an idiopathic fever, and this was done in the essay already quoted.

Dr. H. C. Wood, in a report of some cases of sunstroke, observed while resident physician in the Pennsylvania Hospital (published in American Journal Medical Sciences, Oct., 1863), concurs in this view of the pathology of the disease and of its febrile character. Professor Wood, of Philadelphia, in the sixth edition of his treatise on the Practice of Medicine, has carefully elaborated this subject, and presented it to the profession in a form so clear and decisive, as to leave no doubt of its correctness. To him we owe the name of *heat fever*, and to him, undoubtedly belongs the merit of giving distinctness and shape to what before had been perhaps but imperfectly shadowed forth.

In speaking of the essential pathological phenomenon of heat fever the expression has been used, an altered blood, rather than a poisoned blood. There is indeed, no evidence that, primarily, it possesses any poisonous principle. Doubtless with the failure of function the blood becomes loaded with the detritus of tissue, and uræmia or other toxæmia may be induced.

This absence of toxic properties would seem to be established by the experiments of Dr. R. Cresson Stiles. (See

Boston Medical Journal, vol. 70, No. 18, June, 1864.) This physician immersed various animals in water at a temperature of 115° F., and held them there by the back of the neck, the head above the surface; others were placed in glass jars of sufficient capacity for free respiration during the experiment, a thermometer suspended from the cover of the jar, and the jar immersed in hot water. The temperature of the interior of the jar was raised above 115° but not to 120°. In a cat that had died in the heated air, with the symptoms of heat fever, the thorax was opened, and blood drawn from the vena-cava ascendens with a hypodermic syringe. This was immediately injected into the jugular vein of another cat, previously etherized. "*Not the slightest toxic symptom was manifested.*"

It would seem then as if it were a loss of its life rather than a poison in the blood, to which the phenomena and results of heat fever are due. This loss of life is seen not only in the change of physical properties, in the non-coagulating fibrin, in the shrunken corpuscles, in their escape from the vessels, forming myriads of petechiæ, but also in its rapid putrefaction, commencing, it would almost appear, even before general death had occurred.

Accepting this state of the blood in heat fever as an established clinical fact, it becomes a matter of great interest to learn in what manner this marvellous change is so suddenly effected. A change in the blood crasis, which in typhus fever may not be developed for days or weeks, is here produced in a few hours. The writer frankly confesses that he has never yet been able to solve this problem to his entire satisfaction. He is yet at a loss to decide whether this is the effect of heat acting directly on the blood, through the respired air, and other avenues of heat conduction, producing in this way its loss of vitality, completely or incompletely, and setting on foot chemical changes, or whether the nervous system has some intermediate and as yet undetermined agency in the causation of these phenomena.

With the view of determining the direct effect of heat on the blood, out of the body, the following experiment was

kindly performed for the writer by his friend Dr. Curtin, of the Philadelphia Hospital. Four ounces of blood taken from the arm of a healthy woman were divided into two equal portions, and one of them set aside for coagulation. Under the microscope this latter exhibited all the appearances of healthy blood. In twelve minutes' time a clot had formed. The second portion was gradually heated in a sand-bath until a thermometer placed in it was at 120° F. Under the microscope the red corpuscles were now found to be about half their usual size, shrivelled, and crenated. This blood coagulated in five minutes less time than the first portion did. So far then as this proves anything, it would seem to show that while the vitality of the corpuscles of the blood may be destroyed by heat alone, something more than this is required to destroy its property of coagulating, when drawn from the circulation.* Whatever difference of opinion there may have been among physiologists as to the cause of animal heat, all agree that it is only within a limited range of temperature that the reciprocal action between the cells of the organs and the nutrient fluid can take place. Above or below this the action is impeded or destroyed. In the blood itself, a constant metamorphosis is going on, which is in fact, the most obvious manifestation of its vitality. When it ceases to undergo this change it dies. With this death of the blood, or even while this is yet incomplete, comes the failure of nutrition, secretion, respiration, and all the essential functions of the economy.

Heat fever it will thus be noticed differs greatly from that other form of sunstroke which has been designated as exhaustion from heat. As it differs from it in its pathology,

* Professor Wood (*loc. cit.*) gives the following response to the question, "How does heat operate in producing this disease?" "This will be rendered plain by a recollection of two fundamental principles taught in this work, that heat is a universal stimulant to the organs, and that excessive stimulation, or rather the high degree of irritation which attends it has a tendency first to derange, and in the end to diminish or suspend the functions of these organs." This is further elucidated by a careful examination of the effect of this principle on the brain, the heart, the lungs, the stomach, the kidneys, and the blood.

so it demands a different course of therapeutics; thus alcohol, which is so useful in the latter, is of doubtful value in the former affection. These statements will be illustrated by the brief notices of cases treated in this Hospital during the intense heat of July, 1866.

The following is taken from the Hospital record of the weather during seven days of this month, in each of which cases of sunstroke were received in the house:

| Date. | Thermometer (F.) | | | Dew Point. | Winds. |
|---|---|---|---|---|---|
| | Max. | Min. | 9 A.M. | 9 A.M. | |
| July 4, 1866, | 88° | 70° | 65° | 65 | S. W., S. S. W. |
| " 8, " | 96 | 80.5 | 88 | 74 | S. W., S. |
| " 9, " | 85 | 75.5 | 82 | 66 | N. W., N. E. |
| " 14, " | 97 | 79 | 88 | 68 | W. |
| " 16, " | 98 | 80.5 | 86 | 71 | W. S. W. |
| " 17, " | 99.25 | 83.5 | 91 | | W. S. W. |
| " 18, " | 97.25 | 83 | 90 | 70(2 P.M.) | S. W., N. W.* |

During the week thus noted, twenty-two cases of sunstroke were admitted into the Hospital. Of twelve cases treated with stimulants, cold affusions, or the entire bath, seven died. Of seven cases received between the hours of 1½ P.M. and 2½ P.M. of the 18th, and treated by rubbing the entire body with ice, six recovered, viz.:

G. W. Ash, æt. 55, United States, cured.
J. Gibbons, " 24, " "
J. Boggs, " 36, Ireland, "
J. Furness, " 40, England, "
J. Andrews, " 40, Ireland, "
R. Wooden, " 30, " "
P. Starr, " 65, " died.

From among these the following brief notes are taken: Ash, a goldbeater, weight 156 lbs., aged 55 years; walked four miles to his place of business early in the morning; did not feel very well on leaving home. In the course of the morning was obliged frequently to go to and from the furnace, which was outside of the work-room. In one of these visits he fell, unconscious, and was at once brought to the

* On the 17th and 18th, heavy thunderstorms occurred at or about 3 P.M.

Hospital. When admitted was still unconscious; respiration stertorous, mixed with mucous rattling; the heart's action tumultuous; the pulse so frequent that it could not be counted; the skin pungently hot and dry, and the temperature in the axilla 109° F. This man was stripped of his clothing, and steadily rubbed over his entire body by three men with large pieces of ice, while at the same time pieces of ice were kept in each axilla. This rubbing was continued, without any apparent consciousness on the part of the subject of it, for one hour and fifteen minutes. During this time he had two severe convulsions, and more than once no pulsation of the radial could be detected. At the expiration of this time it was noticed that an effort was made by him to draw the water into his mouth as the melting ice was passed over his lips; this increased, and with it other evidences of returning consciousness. The rubbing with ice was continued until this last was restored, and later iced wine and water were given him. On the following morning he was sitting at his bedside.

Furness, æt. 40, weight 174, shoemaker. This patient had walked early in the day from his home to Fourth and Chestnut Streets, a distance of about three miles. After this had been occupied in a warm work-room on a sewing machine. During this time, although very warm, with a sensation of internal burning, was unable to perspire, and in this state left his work to go home. After walking a mile he fell, and was brought to the Hospital. His condition was much that of the preceding patient; the temperature in the axilla 109°. He was treated with ice as above. Consciousness was restored in forty-five minutes. Next morning was able to answer questions and to give some account of himself.

Boggs, æt. 36, a drayman, born in Ireland, employed at Third and Market Streets. He had been busily occupied all the morning in loading and unloading his dray, fell at his horse's head, and was trodden on by him. Unconsciousness less complete than in the other cases; pulse very frequent; skin hot and dry; pulse 106° F.; respiration ster-

torous, with mucous rattling. Treatment with ice as in preceding cases. Consciousness was restored in half an hour. Returned to his home next day.

It is needless to report in detail the histories of other analogous cases, all of which, under this treatment, recovered. Later in the day another patient, though subjected to the same treatment, died. After death there was found extensive (old) degeneration of the basilar artery, but no clot or softening. Another fatal case, was that of a young man who had been sunstruck on the preceding day. In the fatal case of heat fever occurring in the summer of 1867, it will have been noticed that some hours had elapsed before he was brought to the Hospital and subjected to its treatment. Doubtless much of the success in the cases above reported, was due to the fact, that they were immediately cared for, before there had been time for the complete development of those changes in the blood, which, progressive in their character, must in a little while end in its complete disorganization.

Of the *modus operandi* of ice in these cases, but little need be said. In all probability it acts by its refrigerating properties alone, and yet, when the instantaneous effect of a drop or two of water on the red corpuscle as seen under the microscope is recalled, the question will present itself, can there be any endosmotic action of the water in these cases which is eagerly seized upon by the parched blood.*

* It is interesting, and sometimes instructive, to notice how the same remedy is occasionally employed in the treatment of diseases presenting, perhaps, very different general symptoms, yet agreeing in their essential character, by persons widely remote from and ignorant of each other. Thus, very recently, the writer has met with the following paragraph in "*Traité du Froid—de son action et de son Emploi Intus et Extra en Hygiène, en Médecine et en Chirurgie—par le Docteur la Corbière, &c., Paris*, 1866." "Un écrivain du collége de révision, âgé de dix-sept ans, entre à l'hôpital, ayant la peste. Il avait, à toute la surface du corps, un grand nombre de pétéchies, qui commençaient déjà à devenir confluentes, un charbon très-large à la nuque un autre plus petit à l'hypochondre gauche. Son pouls était très-faible, inégal, fréquent, quelquefois insensible au tact; le visage était très-pâle; il y avait diarrhée, tremblement de la tête aux pieds, somnolence presque continuelle. Le malade ne répondait à aucune des de-

It is much to be regretted that so few accurate observations of the temperature of the body in sunstroke are on record. The following brief table represents those which have come to the writer's notice, though in all probability others might be collected.

| Date. | | City. | Temperature (F.) | Observer. |
|---|---|---|---|---|
| July 24, 1845. | G. F., | New Orleans, | 111° 112° 113° | Dowler.* |
| June 16, 1847. | Irishman, | " | 109 | " |
| May 3, 1844. | Unknown, | " | 99; 104 after death. | " |
| Aug. 30, 1848. | Irishman, | " | 105; 110 after death. | " |
| Aug. 2, 1847. | H——, | " | 106 | " |
| Aug. 2, 1863. | J. B., | Philadelphia, | 108 | H. C. Wood. |
| " 10, " | P. M., | " | 108 after death. | " |
| " " " | C. G., | " | 109 | " |
| " 11, " | C. H., | " | 109 | " |
| " 14, " | J. B., | " | 104 | " |
| " " " | —— | " | 106 | " |
| " 15, " | C. B., | " | 109; 110 after death. | " |
| July 18, 1866. | Ash, | " | 109.5 | Levick. |
| " " " | Furness, | " | 109 | " |
| " " " | Boggs, | " | 106 | " |
| " 6, 1867. | Regan, | " | 105.5 | " |
| " 18, 1866. | —— | " | 112 after death. | " |

mandes qui lui étaient faites; it n'avait ni vomissements ni nausées; il était comme un agonisant; il fut facile d'en conclure que la maladie existait depuis plusieurs jours. Il fut déshabillé, et lavé avec de l'eau froide; les charbons ayant été pansés, on lui fit une friction avec la glace, sans excepter aucune partie du corps. La friction fut continuée jusqu'á ce que le corps fût devenu tout rouge, et que le malade commençât á trembler par l'effet du froid. Les pétechiés étant tres-noires, et très-disséminees, le malade fut enveloppé dans un drap imbibé de vinaigre; après quoi il fut remis son lit, et prit un émétique qui opéra très-bién. A trois heures de l'après-midi, on lui fit une seconde friction glaciale, après laquelle on l'enveloppa encore dans un drap trempé de vinaigre. Le soir, répétition de ces moyens. . . . La friction glaciale et le drap imbibé de vinaigre furent employés quatre fois. . . . Le quatrième jour diminution rassurante de tous les symptômes. La sixième jour le malade se lève et se promène dans la salle—il avait beaucoup sué pendant la nuit. Le septième, les charbons s'etaient détachés de la chair vive, et le malade fut complétement gueri."

* At this time, when so much importance is attached to the thermometry of disease, the writer cannot forbear directing attention to the great injustice (probably unintentional) which has been done a distinguished American physician, the late Dr. Bennett Dowler, of New Orleans. More than a quarter of a century ago, this earnest and indefatigable observer instituted a number of "Experimental researches into animal heat in the living and

To recapitulate, insolation or sunstroke shows itself in two obvious forms: First, *exhaustion from heat;* second, *heat fever.*

*Exhaustion from heat* has a feeble and moderately frequent pulse, a moist skin, and a tendency to syncope on the slightest exertion. It implies a loss of power without obvious structural change, and is successfully treated by rest, the supine position, and the free use of stimulants.

*Heat fever* has a feeble and very frequent pulse, a pungently-hot skin, a temperature as shown by the thermometer of from 104° to 111° F., and is often attended with great nervous disturbance. It has for its constant pathological condition an altered state of the blood, which is liquid after death, and exhibits, under the microscope, shrivelled and crenated corpuscles. It is successfully treated by the rubbing of *large pieces of ice* over the entire body of the patient, until consciousness is restored, after which iced wine and water may be cautiously administered.

Heat fever, whether determined by the resemblance of its symptoms during life or of its phenomena in death, finds its proper nosological classification in close association with typhus fever, spotted or petechial fever, and the plague.

dead body," which for extent of investigation and accuracy of observation, have never been surpassed. The reports of these experiments were published in the New York Medical Gazette, July, 1851, and the New Orleans Medical and Surgical Journal, 1856. They include careful notices of the temperature of the blood taken from the arm of a patient with pneumonia, acute syphilis, and yellow fever. In these cases the blood was permitted to fall on the bulb of a thermometer during its flow from the vein. The temperature in the axilla was carefully noted in remittent, intermittent, congestive, and malignant fevers; in erysipelas, tetanus, amputations, apoplexy, dysentery, enteritis, diabetes, hepatitis, gangrene, ophthalmia, phthisis, cholera, and sunstroke. Not only are these records made with astonishing minuteness, but Dr. Dowler gives specific directions as to the kind of thermometers best suited to this purpose, the importance of noting the temperature of the surrounding air, as well as many other valuable practical suggestions. He anticipates the statements of Ringer and others, in regard to the elevation of temperature in tuberculosis. Is it not surprising that in a recent history of medical thermometry, which has been republished in this country, while full notices are given of the observations of Parkes, Davy, Ringer, Wunderlich, and others, no allusion whatever is made to the careful experiments of Dr. Dowler?

ON THE

# USE OF PAPER FOR SURGICAL DRESSINGS.

By ADDINELL HEWSON, M.D.,

ONE OF THE SURGEONS TO THE HOSPITAL.

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In the month of January of the present year, my attention was called by a statement in one of our daily newspapers to the fact that *paper* had been used in the place of lint as a surgical dressing, in the recent campaigns of the Prussian army. The idea struck me as a good one, and I determined to test its practicability in my next term of service (which was to begin on the first of the following month) at the Pennsylvania Hospital. As nothing, however, was mentioned in the statement referred to above concerning the kind of paper so employed, and as I did not have access to any other source of information at the time, I felt compelled to start *de novo* in the matter.

In the first place, it was quite evident that only *unsized* paper could be used for the purpose, for otherwise prepared it would be so little capable of being applied as we should desire as to render it unfit, if not absolutely injurious, in most of the cases where we have occasion to use the lint. I therefore provided myself with different kinds of white unsized paper (obtained chiefly from my friend Mark Willcox, Esq., of the long-established and well-known firm of paper manufacturers in Delaware County), and determined, first of all, to test the ability of such papers to absorb moisture as compared with that of patent lints. For this purpose I cut off

of each sample a long strip one inch wide, and in the direction in which they would tear most readily. These, with strips of the same width of different kinds of patent lint cut in the direction of the warp, I suspended under a large bell-glass, with the lower end of all of them immersed to the same depth in some water contained in a shallow dish. I repeated this experiment several times in my offices, which were heated by an open-grate fire and were usually of the same temperature, and always got the same results, namely, the ascending of the water more rapidly and to a higher point in all the specimens of paper than in any of the lints. The same results followed when I cut the specimens from an opposite direction.

From these experiments I was satisfied that paper had a decided advantage over lint as an absorbent. I further noticed a difference amongst the papers themselves in this respect, and that not dependent entirely upon compactness or thickness; for although these qualities seemed to exert a direct influence, still there was a difference where no such distinction could be made out by me. This, on inquiry, proved to be due to the character of linen employed in making the paper, and the articles used to adulterate it. Those papers made from *new* linen rag absorbed far more rapidly and liberally than those from old rag, and the freer from adulteration the better was this power possessed. But the most inferior article of paper (even that made from straw and wood fibre) possessed a greater absorbing power than that of any of the patent lints.

I next sought to ascertain the difference in the power of *retaining* moisture, amongst the various specimens with which I was experimenting. This I did by laying the strips, all previously saturated with water, on a board, and, leaving them uncovered, I watched carefully to see which became dry first. Here the advantage seemed to be with the lints; but as there were differences amongst them, as well as with the papers, in direct ratio with their thicknesses, the difference was evidently due to that circumstance chiefly. A double thickness of the thinnish paper destroyed this ad-

vantage of the best of the lints; that is, it made such paper an equally good retainer of moisture.

The next point I thought advisable to consider was the difference of pliability. This was certainly a very important point, and really seemed to be a serious objection to paper, for between it and lint there could be no comparison in this respect. But taking into account the great power of paper to absorb moisture, it became evident that this would not prove to be so serious an objection, for in cases where we use dry dressings, as to stop oozing, to provoke coagulation of either blood or serum, or to sop up profuse discharge, the paper rapidly becoming moist, would then be as soft and pliable as the best of lints; and its greater powers of both absorbing and parting with moisture would, in the first two of these cases, give it a decided advantage over the lints. Where we would want either a greasy or wet dressing such application by the paper would soon make it perfectly pliable.

This next led me to consider another objection which had occurred to my mind, namely, the deficiency of *cohesiveness* in paper when wet, which might interfere with its use. This, to my surprise, was not as great as I had anticipated, and did not depend so much as I supposed it would on the compactness with which the fibres of the paper had been compressed together in the process of calendering, for I found some samples of the best blotting-paper, with evidently very loose texture, capable of absorbing more than twice its own weight of water, and yet so strong as to admit of a sheet so saturated being held up by one end without tearing; whereas, there were other samples, evidently more compact and less capable of absorbing fluid, not so strong. The strength of paper I found, on inquiry, to be due to length and character of fibre, and not, as might naturally be supposed, to compactness of structure.

Being thus pretty well assured of the feasibility of using paper instead of lint, my next question was to settle on the kind of paper best suited to our purposes. Past experience with the use of cotton, cotton cloth, and oakum, had

well taught me that the general notion of flax or its product, linen, being the only material proper to use in dressing wounds and sores, was without foundation in fact. I was, therefore, chiefly influenced by considerations of lightness and cheapness, with due allowances for absorbing and retaining powers and cohesiveness, in the selection of the article. And it became apparent to me that the commonest white paper with which I had been experimenting, namely, such as is used for newspapers and for wrappings in our drug stores, would be the best. There was nothing in the chemicals used in the preparation of such paper, as far as I could ascertain, which could militate against its general use. And if it should be found to meet all our requirements, I knew that the facility of obtaining such paper everywhere, and its extreme cheapness, would commend it to every one.

My subsequent clinical trials have satisfied me of the correctness of all my inferences; and during the whole six months of my service I excluded all other kinds of dressing or media for dressings, except, of course, in the application of poultices, where it was absolutely essential to use some firmer texture. I thus tested "paper dressings" in all varieties of simple, incised and lacerated wounds, in compound fractures, on suppurating surfaces, whether inflamed, indolent, or otherwise, and in all the major and minor operations which I performed, both as primary and secondary dressings, and with never any results which could lead me to consider paper inferior to the other means which I had been in the habit of employing for these purposes.

These trials demonstrated, as might have been anticipated, different advantages for different kinds of papers, as, for instance, the best qualities of blotting-papers had the advantage as absorbents, as it had been demonstrated they would have, and in the ratio of quality and thickness as before indicated; but their avidity for moisture and their power of parting with it were so great as to make them a source of irritation when applied dry to any suppurating surface. This was evidently controlled, in a measure, at least, by placing over them some impermeable substance,

like oiled silk, to prevent evaporation, but this was not desirable when the employing of a cheaper article which possessed such properties in a less degree would do away with the disadvantage.

When I wanted to stanch capillary hemorrhage these blotting papers acted most admirably, and even replaced many articles possessing such power better than patent lint.

But, as I before remarked, my efforts were directed to finding the cheapest as well as the best of substitutes for lint in the way of paper, and I soon settled on the common newspaper as fulfilling all our requirements equally well, *if not better*, than the lint. The contrast in the relative cost of such and lint can be well appreciated by the following figures and facts:

Paper of medium thickness, used for newspapers, weighs usually 34 lbs. per ream of 480 sheets, and costs 16 cents per lb., or a fraction over one cent per sheet. This sheet measures 24 x 38 inches, therefore contains 911 square inches.

The lint we have been using for some years past is 15 inches wide, and would require a fraction over 2 yards to furnish the same surface; but, allowing for using the paper double, we may fairly estimate one sheet of the paper equal to 1 yard of the lint. A yard of this lint weighs 9.90 grs. troy, or a fraction less than the sixth of a pound. This lint cost actually $2.05 per lb.; but, setting aside the fractional amounts, we may fairly state that a yard of good patent lint cost 33 cents. Now this I found equalled in usefulness as a surgical dressing by a sheet of paper which cost *about one cent.* Even were we to use the best quality of blotting-paper made of purest linen fibre, without shoddy or adulteration, the difference by the same mode of calculation would be as 3 cents to 33 cents in the favor of paper.

Economy, however, is not the only advantage which I have found in the use of paper over lint, linen rags, or muslin. On occasions where we have to use cerate or ointment, it gives us positive advantages over all other means. Most practitioners have, I have no doubt, been struck with the

advantages derived from the use of blistering ointment spread on paper—a practice in vogue for many years amongst our pharmaceutists. These same advantages, namely, not only the requiring of less cerate, but its firmer adherence to the paper, have been experienced by me when using this mode of applying cerates or ointments.

But I have not been content with the substitution of paper for lint only. I have sought to make it available in the place of oiled silk, of which we use so much as a covering from evaporation to our wet dressings, poultices, &c.; and this I have accomplished most effectually by using tissue-paper coated with a thin layer of yellow wax. This coating was easily done by the convalescent patients and nurses in my wards, by a very simple process. A large bread-pan, of sufficient length to equal the width of my sheets of paper, was filled half full with melted yellow wax, and then set in a larger pan containing hot sand to keep the wax in a fluid state. A strip of bevelled wood-moulding (such as is used to finish off the washboards and wainscotings of our houses) was then placed along one side of the pan to serve to strain off all surplus of wax after the paper had become thoroughly saturated. Thus as a sheet of the paper previously dipped in the wax was drawn across this moulding by one person, another pressed it down with sufficient firmness so as to wipe off all the redundant wax in the groove on the piece of moulding, by means of a piece of wood having a smooth, sharp edge to it. Each sheet required about 3½ drachms (more or less) of wax to give it a perfect coating in this way; and thus we have, by calculation, to allow 15 lbs. of wax to every ream of tissue-paper. This amount of wax cost us, allowing for waste, about $7.50 (actually $7.20), and the paper $2.50; making the whole cost, we may say, exactly $10. A sheet of this waxed paper, when trimmed and ready for use, cost us thus about 2½ cents; and containing, as it did, 540 square inches, it was equal in surface to half a yard of oiled silk having a width of 30 inches. Such silk has averaged, in the last two years, about $1 per yard; but its durability was such as to enable us to use it over and over again in the same

case. As, for instance, the same piece would serve as a perfect covering for poultices six or seven days; but where we had to use it over an application of a solution of chloride of lime, of sulphite of soda, or the like, its surface would become broken, and therefore worthless, in forty-eight hours' time. Allowing, then, an average durability for oiled silk of five days—which, for the quality of the article we have been in the habit of using, was a very liberal allowance—we fairly estimated the silk would last five times as long as an equal amount of waxed tissue-paper; for we of course expected to discard the latter always after twenty-four hours of use.

Our experience has shown that this calculation was a perfectly fair one, for we have effected a positive saving of over 400 per cent. on this item in our dressings during the past six months, and this has been done without any efforts of stinting or economizing in the use of such coverings. Extraordinary as this result is, I have recently become satisfied that a still more economical substitute for oiled silk is to be found in the Manilla paper waxed in the same way. This is the paper very generally used at the hotels for water-closets, and is universally known in that way to be both soft and strong. It comes in very much larger sheets than the tissue-paper, and costs 7 cents less per ℔. A ream of such paper will furnish exactly one-third more surface than a ream of tissue will, and costing so much less, the substitute for oiled silk made of it will, I am satisfied, save almost 600 per cent. But this is not all. I am sure that we make a positive gain in such a substitution for oiled silk by the advantage it affords of discarding everything appertaining to the dressings each day, by which we escape one source at least of renewing contamination experienced in the use of oiled silk.

EXTRACT FROM A CLINICAL LECTURE

ON CERTAIN

# FORMS OF MUSCULAR RHEUMATISM,

PARTICULARLY WRYNECK AND ITS TREATMENT.

By J. M. DA COSTA, M.D.

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We have now been studying several cases of muscular rheumatism, which have given you, I trust, an idea of the nature of the disorder; and you have had occasion to notice that they belong either to the chronic variety of the disease, or hold, as they so very commonly do, an intermediate position between the acute and chronic, forming a manifestation of the complaint usually designated as subacute. The cases you have seen have at the same time taught you the most frequent seat of the affection, and have brought to view its peculiar features when happening chiefly or wholly in a particular part. In further consideration of the subject, I shall call your attention to the patient before us.

She is nineteen years of age, and has been living in this city for some years as a domestic, much exposed to wet and cold. The present attack of rheumatism, her first, began last Christmas, with pain in various joints, and swelling of the left knee and of the ankles. She has been most of the time confined to bed since then, and on her admission into the Hospital, on the 15th of February, though there was no absolute swelling of any joint, the left ankle, knee, and hip were stiff and painful upon motion. Much pain also existed

in the cardiac region, but not associated with any disease of the heart. She was placed upon iodide of potassium in five-grain doses three times daily, and Dover's powder at night.

Under this treatment, she improved much; it had, however, no effect on a stiff neck, noticed soon after her admission, and which, by the 28th, had produced that fixed, ungainly position of the head and neck, with the head held awry, of marked torticollis. The muscles affected were the sterno-cleido-mastoid of one side, and the trapezius; the contraction of the latter giving rise to the elevation of the point of the shoulder, and to the awkward, hunched appearance she presented. Frictions and the ordinary remedies were of no avail, and $\frac{1}{50}$th of a grain of sulphate of atropia was directed to be injected just over or into the rigid parts, hoping thus to relax them.

The hypodermic injection was administered on the 8th of March, and at once a decided amelioration was observed; the same quantity was made use of on the 9th, and on the 10th it was noted that the stiffness of the muscle was almost entirely gone. The remedy was repeated, and on the 12th the neck was supple; all distortion had disappeared; the head could be moved in every direction freely and without pain. The solution was injected, on the 13th, into the left leg, the knee and ankle joint of which were still very stiff and painful,—the seat of the trouble being, however, it seemed, chiefly in the tendons in the neighborhood of the joints. No beneficial result followed. But I may add that a complete recovery gradually took place by persisting with the constitutional treatment she was on.

In showing you this patient now, and in examining her case with you, I do not do so to dwell on any of the symptoms she presented, typical though they were, but to discuss with you their management. Generally, this form of torticollis will yield to warm fomentations and to friction with opiate or stimulating liniments, sometimes slowly, sometimes quickly,—the more quickly, as a rule, if internal treatment be at the same time resorted to. But here all these agents were employed, and to no purpose. It was then that

the use of atropia suggested itself to me, and the record proves what good, and how rapidly that good, came from it. In cases, therefore, similar, in cases at all resisting, or in which you may fear that so much rigidity of the muscles may happen as to render it difficult for them to regain their former condition, I would recommend this therapeutic procedure strongly to your consideration.

But I must put you on your guard against supposing that it will be equally useful in very chronic cases, where wasting of the affected muscles has taken place, or in congenital torticollis; or that you could resort to it with any chance of success in paralytic wryneck, or in wryneck from disease of the cervical vertebræ. In the latter forms, the treatment usually centres in the constitutional remedies and in the means for mechanical support; in the former, the knife of the surgeon is often employed to give the desired relief. But might not here, at times, atropia injections be a useful adjunct to, if they have not the power of being a substitute for the tenotome? And in those instances of jerking, violent spasm of the sterno-mastoid, causing wryneck, in which even subcutaneous division of the muscle affords only temporary relief—for such it proved in the skilful hands of Stromeyer and of Little—atropia injections seem well worthy of careful trial. Moreover, in cases in which no decided structural alterations of the muscles are supposed to have happened, and in which, after rubbing, attempts are made to stretch the rigid muscles—as recommended, for example, by Chelius—atropia used hypodermically suggests itself as a better preliminary treatment.

The idea has probably occurred to you that the same agent can be usefully employed in other forms of muscular rheumatism. *Ex uno omne disces* is, however, not a maxim in clinical medicine; for nothing can be accepted that is not proved by direct observation. I will cite a case in which we had an opportunity of making such an observation.

A sailor, about forty years of age, was in the Hospital not long since for bronchitis, and he was frequently also much annoyed by pain and aching across the loins, increased on

motion. The affection was, however, comparatively in abeyance, when some imprudence brought on an attack of lumbago rather more severe than those to which he had been accustomed. The treatment employed, by diaphoretics, opiates, and friction, was without effect; and the patient complained bitterly of the pain and of the stiffness, which prevented him almost entirely from walking. The muscles in the lumbar region, along the spine, were quite rigid and painful on pressure. Somewhat less than $\frac{1}{40}$th of a grain of sulphate of atropia in solution was injected near the affected part by my assistant, Dr. Hare, and its action closely noted. The constitutional effect was very marked. In about fifteen minutes the man had become giddy; his throat very dry; his pupils were widely dilated. This state lasted for some time and alarmed him; but when it passed off, the pain and rigidity of the muscles had gone; nor did they reappear during the three days he remained afterwards in the Hospital. A careful examination of the muscles of the back detected no longer the least abnormal condition. I have since learned, through the zealous inquiries of Dr. Hare, that the man was seen eight or nine weeks after his departure from the Hospital, having in the meanwhile been upon a voyage, and though exposed to bad weather, he had not had any return of the trouble.

You will see, then, that in this case, as in the one exhibited to you, the atropia was very serviceable; and, as in the former instance, the disorder was not readily influenced by other means, but was also comparatively recent, and one in which no structural alteration in the muscles or surrounding textures had taken place.

# LIST

OF

# THE MORE IMPORTANT SPECIMENS

ADDED TO

## THE PATHOLOGICAL MUSEUM

DURING THE PAST YEAR.—WITH DESCRIPTIONS.*

By WILLIAM PEPPER, M.D., Curator.

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### Bones.

1001[5]. *Dorsal Vertebræ*, showing spina bifida.—There is a deficiency of the spinous processes of the ninth and tenth dorsal vertebræ. The dura mater is adherent around this opening, and continuous over the sac of the spina bifida. The spinal cord was quite normal, none of its fibres entering the sac. There was thickening and opacity of the membranes of the brain, and distension of the lateral ventricles, each holding f℥iij of serum.

Case of Benjamin Miller, æt. 32, admitted to Pennsylvania Hospital, August 17th, 1866; soon became profoundly unconscious, without any paralytic symptoms, and died on the fourth day. There was an oval tumor three and a half inches long in the lower part of the dorsal region; and it was learned, that whenever this tumor was pressed upon,

* The name of the donor is affixed in all cases where the specimen has not been obtained from cases occurring in the wards of the Hospital. Full reference is also given to the descriptions of any of the following specimens which have been elsewhere published.

he suffered violent headache with temporary delirium. (Dr. W. Pepper, Proc. Path. Soc. of Phila., Nov. 14th, 1866.)

1009[5]. *Fracture of Cervical Vertebræ*, with anterior dislocation.—The left articulating process of the sixth vertebra is broken off, allowing anterior dislocation of the fifth, compressing the spinal cord. There is also a comminuted fracture of the atlas, the lateral masses being separated, and the arches broken in two places; there was no marked laceration or compression of the cord at this point.

Case of Mary Nicholson, æt. 19, admitted to Pennsylvania Hospital, July 5th, 1866. She was a large, heavily-built girl, and had fallen, twenty-four hours previously, from a small tree, the fall not exceeding ten feet in height. There was paralysis of motion and sensation from clavicles downwards. Mind clear; pulse small and frequent; respirations 32 in the minute and diaphragmatic; cheeks flushed and very hot; temperature in left axilla 108.5°; no involuntary discharges. Death occurred suddenly while changing her position, twenty-four and a half hours after injury. (Dr. W. Pepper, Proc. Path. Soc., September 26th, 1866.)

1040[5]. *Right Orbit*, showing punctured fracture of posterior wall.—Case of Nellie Taylor, æt. 18, admitted to Pennsylvania Hospital, April 25th, 1866. She was completely unconscious, with violent convulsive movements of the extremities during the first few hours, but finally entire abolition of voluntary and reflex movements ensued, with involuntary discharges, stertorous breathing, and death in thirty-eight hours.

There was a small wound half an inch long over inner canthus of the right eye; the knife then chipped a splinter of bone from the orbital ridge, traversed the orbit, and entered skull through the posterior wall of the orbit, external to the optic foramen, penetrating the anterior part of the right middle lobe of the cerebrum to the depth of more than one inch. The surrounding brain-substance was broken down, and there was a large clot over the convexity of the

anterior and middle right lobes, while some blood had also escaped under the tentorium, compressing the base of the brain. (Dr. W. Pepper, Proc. Path. Soc., vol. ii, May 9th, 1866.)

1050[5]. *Phosphor-necrosis of Inferior Maxilla*, showing the entire right half of the bone involved in the disease, the body being most affected; about one and a half inches of the left side were also involved.—There are numerous patches of spongy or spiculated osteophytes on both the external and internal surface; the alveoli are enlarged, and in places almost destroyed, and but four sound but loose teeth remained at the time of the operation. The bone is discolored and somewhat too friable.

Case of Frederick Courtney, æt. 22, admitted to Pennsylvania Hospital, January 11th, 1865. He had been engaged in the manufacture of lucifer matches for sixteen years, and the disease had existed fully seven months. The whole of the right half and part of the left half of the lower jaw were removed without external incision, and patient made very rapid recovery, a considerable amount of new bone being formed along the line of the jaw. (Dr. William Hunt, Am. Jour. Med. Sciences, April, 1865.)

1067[5]. *Scapula*, showing radiating and comminuted fracture involving the body of the bone both above and below its spine.—Case of John Mealy, æt. 30, admitted to Pennsylvania Hospital, June 2d, 1866, with a wound in the left shoulder caused by a wad discharged from a musket, the load having contained no ball. There was extensive infiltration of the muscles of the back, with profuse sanious discharge; exhaustion and death on the ninth day from formation of heart-clot. Part of the wad was removed at time of admission, the rest, more than three-quarters of an inch in diameter, was found beneath the scapula. (Dr. W. Pepper, Proc. Path. Soc., vol. ii, page 237, June 27th, 1866.)

1098. *Ulna and Radius*, from a case of enchondroma of

elbow.—The soft parts having been removed by maceration, the olecranon process is completely separated from the shaft; the upper end of which forms a cup-like expansion more than two inches in diameter, in which the olecranon now lies loosely. The apposed surfaces present a loose, cancellated structure. The upper third of the radius is also involved, and presents a gnawed, irregular surface, with numerous osteophytes. The anterior surface of the humerus, for a short distance above the condyles, is roughened and irregular. All of these parts were involved in the enchondromatous growth.

Case of Bernard Coyle, a laborer, æt. 30, admitted to Pennsylvania Hospital, February 24th, 1866. There was a large enchondromatous tumor, springing from the neighborhood of the right elbow-joint, for which amputation was performed in the lower third of the humerus. The patient died of pyæmia.

1115[10]. *Pelvis*, showing comminuted fracture, chiefly involving the left side.—The posterior part of the left ilium is broken into three pieces, and the anterior rim of the sacro-ischiatic notch broken off, forming a sharp falciform fragment, which was so displaced as almost to sever the great sciatic nerve as it emerges from the pelvis. There is also a simple fracture of both rami of the right os pubis. The subperitoneal fascia was infiltrated with blood, and the psoas, iliac and gluteal muscles ecchymosed and lacerated.

Case of Abby Brown, æt. 65, admitted to Pennsylvania Hospital, April 19th, 1866, having fallen about fifteen feet from a window on to the stone pavement. She was completely unconscious, with entire abolition of reflex and voluntary movements of body, paralysis of the left side of the face, diaphragmatic respiration. Death followed in twenty-one hours. There was, beside fracture of pelvis, extensive meningeal apoplexy, but no fracture of the skull; double fracture of the ten upper ribs on the left side, the two lower ones being broken in but one place; a Colles's fracture of left radius, and a fracture of both bones of the right leg in

the lower fifth. (Dr. W. Pepper, Proc. Path. Soc., vol. ii, p. 226, April 25th, 1866.)

1122[5]. *Upper Third of Femur*, showing results of osteomyelitis, removed by amputation at the hip-joint.—The specimen measures eight inches in length; the bone is light, its external surface very porous, with one large oval cloaca. A long loose sequestrum is inclosed in the shaft, extending up into the neck of the femur, and which projected through the ulcerated capsular ligament. The head is ulcerated at its junction with the neck, and the shape of the latter is much altered. The acetabulum was quite healthy, the articular cartilages not being affected.

Case of E. D. Ulmer, æt. 21, admitted to Pennsylvania Hospital, January 22d, 1866. His left thigh was fractured by a minie ball, October 19th, 1864; and an attempt had been made to save the limb, which was followed by sloughing and discharge of fragments of bone. Secondary hemorrhage occurred November 24th, 1864, and amputation was performed in middle third of the thigh. Fragments of bone were again discharged in March, 1865, when three inches of the end of the femur was amputated. The discharge continued, and January 22d, 1866, another large hemorrhage took place, and again on February 15th, sixteen months after the injury. Amputation at the hip-joint, by Dr. Morton, was followed by perfect recovery. (Dr. T. G. Morton, Amer. Jour. Med. Sciences, July, 1866, vol. lii, p. 17.)

1141. *Femur*, showing results of a compound comminuted fracture.—The bone is diseased from the condyles to within two inches of the lesser trochanter. The shaft has been fractured obliquely, with much comminution, and union has taken place by the formation of a very large amount of dense bony structure, which projects in spurs and ridges. There is a large irregular cavity, bridged over in places by newly-formed bone, which still contains several large sequestra. One or two small fragments of lead are still imbedded in the bone.

Case of James McGeehen, æt. 48, admitted to the Pennsylvania Hospital, April 9th, 1866. He was wounded by a minie ball at Gettysburg, July 1, 1863, the ball traversing the right thigh and comminuting the shaft of the femur. The thigh became much thickened and heavy; the original wound closed, but numerous fistulous openings formed during next two years, discharging not less than fifty small pieces of necrosed bone, and the discharge of pus averaging a gill daily. Amputation at the hip-joint was performed April 21st, 1866, by Dr. D. Hayes Agnew. The patient had not an unpleasant symptom, and union of flaps was almost complete, when he died suddenly on the twelfth day, from a small hemorrhage following the separation of the ligature on the femoral artery. (Case X, in Dr. T. G. Morton's article, Amer. Jour. Med. Sciences, July, 1866.)

### Nervous System: Integument and Special Senses.

1225. *Portion of Spinal Cord*, showing gunshot wound.—The ball penetrated the left lobe of the thyroid gland, and the œsophagus (see Specimen No. 1287), and then traversed the bodies of the first and second dorsal vertebræ, and the intervening cartilage, and buried itself in the substance of the right anterior and middle columns of the cord. There was some hemorrhage into the sheath of the spinal dura mater, and œdema of the connective tissue outside the cord, but no meningitis. The ball is a round one, one-fifth inch in diameter, and is not much flattened.

Case of Edward Thomas, æt. 22, who received a pistol wound in the neck; he became immediately paralyzed from the arms down, and died in twenty-five hours. (Dr. W. Pepper, Proc. Path. Soc., vol. ii, page 191.)

### Brain.

1231. *Brain*, showing softening of right anterior and middle lobes, following embolism.

Case of Mary Foley, who died in Pennsylvania Hospital, with aortic disease (see Specimen No. 1520). She became

suddenly paralyzed on left side, and at the autopsy, the right middle cerebral artery was found obstructed by a firm, adherent clot, and a large part of the anterior and middle lobes of right hemisphere was softened to a creamy consistence.

1247. *Fatty Tumor*, removed from an old man.—The tumor is oval, and of large size, weighing four and a half pounds, and measuring nine inches in its long diameter. It consists of large lobes of adipose tissue with delicate septa of connective tissue; the skin was quite movable over it, excepting at one part, where it was discolored and beginning to ulcerate. It was rather loosely attached to the anterior surface of the arm, and had been growing for many years. There was a similar tumor of smaller size, on one of his legs. (Dr. T. G. Morton, Operation Book.)

1247[5]. *Fatty Tumor*, from perineum.—The tumor had been growing for sixteen years, was single, pendulous, and almost spherical, measuring four inches in diameter. The skin covering it is quite healthy. Its structure consists of pure adipose tissue in large lobes, with thin septa of connective tissue. Removed by elliptical incision from I. C., æt. 45. Rapid recovery. (Dr. W. Pepper, Operation Book, April 22d, 1866.)

## Special Senses.

1243. *Adenoma of Tongue.*

Case of Mary M., æt. 16, admitted to Pennsylvania Hospital in October, 1865. There was a tumor of hemispherical shape, about one and a half inches in diameter through the base, situated on the posterior part of the tongue, immediately in front of the epiglottis. Its surface was very red, with large distended vessels coursing over it; it did not pulsate, but was quite elastic, with a sense of indistinct fluctuation on palpation. Subsequent microscopic examination showed it to be a soft adenoma. The tumor was strangulated by a double ligature. The patient died on the third day, apparently from reflex paralysis of the pneumogastric nerves.

(Dr. W. Hunt, Amer. Jour. Med. Sciences, January, 1866, page 163.)

### Digestive System.

1287. *Gunshot Wound of the Œsophagus and Thyroid Gland*, the ball having penetrated the left lobe of the gland, and both walls of the œsophagus; it then traversed the bodies of the first and second dorsal vertebræ, and buried itself in the spinal cord. (See Specimen No. 1225.)

Case of Edward Thomas, æt. 22, admitted to Pennsylvania Hospital, October 30th, 1865. He had received a pistol-shot fifteen hours previously, the ball entering the neck, one and a half inches above clavicle, and one inch to the left of the median line, in a direction from above downwards, and from left to right. There was profuse hemorrhage, and whatever food or drink were taken, were discharged through the wound. He became paralyzed from the arms down, and died twenty-five hours after injury. (Dr. W. Pepper, Proc. Path. Soc., vol. ii, page 191.)

1293. *Hemorrhagic Erosion of Gastric Mucous Membrane.*—The mucous membrane of the stomach was thin, with six or seven superficial ulcers, from one-sixth to one-half an inch in diameter, with dark, reddish-black bases. This dark matter contained hæmatin in abundance, as crystals and granules; a few altered blood-corpuscles, cells, and fragments of glands deeply stained, and some free oil.

Case of Evan Clownley, æt. 53, admitted to Pennsylvania Hospital, March 29th, 1866, with a sloughing wound of the right thigh. Extensive burrowing followed, the discharge was profuse and fetid, rapid emaciation ensued with hebetude, colliquative sweats, hiccough, and he died April 11th, four weeks after injury. There were no metastatic abscesses; the blood was fluid, bistre-colored, and many of the red corpuscles crenated. (Dr. W. Pepper, Proc. Path. Soc., vol. ii, page 225.)

1315[5]. *Constriction of Ileum*, four inches above valve, by

a band of organized lymph, extending from the end of the appendix vermiformis to a loop of ileum.—This band was one-third inch thick and one-half inch long, and adhered tightly to the constricted part of the bowel. The mucous membrane had been completely destroyed at the point of pressure. The rest of the intestine was healthy.

Case of John Hagy, æt. 55, admitted to Pennsylvania Hospital, March 6th, 1866, with a hernial tumor in the left groin and symptoms of obstruction of the bowels. As the tumor was irreducible, Dr. Agnew cut down upon the sac, which was much thickened and indurated, but contained no bowel; a ligature was passed around the constricted portion, and the remainder removed. (See Specimen No. 1439.)

Symptoms of obstruction continued, and the man died on the third day. (Dr. T. H. Andrews, Proc. Path. Soc., vol. ii, March 17th, 1866.)

1320. *Small Intestine*, from a case of cholera.—The peritoneal coat was much injected. The mucous membrane is thinned, softened, and shreddy in the duodenum and jejunum. In parts of the ileum it was entirely destroyed. The solitary glands were much enlarged, especially in the duodenum and lower part of the ileum. Peyer's patches were also prominent. The intestines contained a very large quantity of fluid, resembling rice-water. The stomach was somewhat congested, but its follicles were not much enlarged. It contained a light-brown fluid.

Case of Peter Lum, a German, æt. 27, who was admitted to Pennsylvania Hospital, July 15th, 1866, in a state of profound collapse, and died a few minutes after admission. He had been attacked with cramps, vomiting, and purging, five hours previously.

1320$^5$. *Lower part of Ileum and Cæcum*, from same case.—The mucous membrane of the ileum is much destroyed; Peyer's patches have a rough, reticulated appearance. The mucous membrane of the cæcum is comparatively healthy,

but presents very many small oval ulcers, like depressions, due to disease of the follicles.

1350. *Small Intestine*, showing a small, firm, whitish nodule, about one-half inch in diameter, attached to its outer surface, and presenting the microscopic appearances of epithelial cancer. There were several other nodules of similar characters.

Case of a woman, from whom Specimen No. 1693, of piliferous ovarian cyst, communicating with the intestine, was obtained.

1351. *Jejunum*, showing a rupture two-thirds of an inch long, near its upper parts. The edges of the rupture are quite regular, and drawn apart by the contraction of the muscular coat. The peritoneal cavity contained both fæces and urine, the urinary bladder having also been ruptured near its fundus. (See Specimen No. 1646.)

Case of Mary Stephenson, æt. 38, who was admitted to Pennsylvania Hospital, August 20th, 1866, and died in eighteen hours with acute peritonitis. She had fallen from a second-story window.

1367. *Appendix Cæci*, showing ulceration.—Case of W. W——, a healthy man, æt. 25, who had presented symptoms of obscure intestinal trouble for a few days, followed by rapidly-fatal general peritonitis.

At the autopsy, diffused peritonitis was found, especially marked in the right iliac region. The omentum was adherent to vermiform appendix, forming a cap for it. The cavity of the appendix was distended with purulent matter, and containing a small intestinal concretion, much resembling a cherry-stone. The appendix shows two quite large oval ulcers, the deeper extending down to the peritoneum, which is very thin and coated externally with a layer of soft lymph, and it is quite possible that a minute perforation had occurred. The rest of the intestinal canal was entirely healthy. (Dr. W. Pepper, Proc. Path. Soc., vol. ii, April 26th, 1867.)

1368. *Appendix Cæci*, showing result of perforation.—The appendix is changed into a firm, dense, fibrous cord, its cavity being obliterated. About one-third inch from its free end there is an opening, with firm, rounded edges, leading to the middle of this cord. On the exterior, attached quite firmly around this opening, there was a reddish-yellow, jelly-like mass, about three-fourths inch in diameter, which consisted of shrivelled blood-corpuscles, a few nucleated cells, and a little fibrous tissue, and undoubtedly was an altered blood-clot. This mass has contracted greatly from immersion in spirit.

Case of an old man, who died with enlarged prostate and vesical hemorrhage, from forced catheterism. (See Specimen No. 1663.) No history of the occurrence of the perforation of the appendix was obtained. (Dr. W. Pepper, Proc. Path. Soc., January 23d, 1867.)

1373. *Rectum*, showing villous cancer, ulceration into the bladder, and perineal fistula.—About four inches from the anus there is complete obstruction of the rectum, from cancerous infiltration of its walls and the projection into its cavity of an irregular, flat encephaloid growth, surmounted by numerous close-set, fringe-like villous processes. In places this villous growth separates from the mucous membrane, in the form of a thin, reticulated layer. There were also several small submucous, cancerous deposits higher up in the intestine. The pelvic viscera were matted together, and two false passages existed between the urinary bladder and the bowel, one opening into the rectum, the other into the ileum, about two feet above the valve. In addition to this, the wall of the rectum is perforated, allowing fecal matter to escape between the rectum and bladder; thus forming a cavity, which discharged by two small fistulous openings in the perineum.

Case of a soldier, æt. 42, admitted to Pennsylvania Hospital, with chronic dysentery. The stools were frequent, thin, and offensive, rarely, if ever, containing blood. There was great tenderness over hypogastric region, and finally a discharge of flatus and fæces through penis, and of urine

from the anus. Double perineal fistula formed, and death ensued from exhaustion.

1409. *Gall-Bladder*, showing very numerous ulcers, extending through the mucous membrane, and varying in size from a mere point to half an inch in length.—These are oval or rounded in shape, with sharply-cut edges, and have a good deal of pigment deposited in their bases. The walls are not materially altered. The gall-bladder contained many small, irregular, black calculi. History unknown. (Dr. W. Pepper.)

1413. *Gall-Bladder*, contracted around a calculus.—The walls of the gall-bladder are much thickened, and tightly contracted around an oval calculus about one inch in length, the cavity being thus entirely obliterated. The cystic duct remains patulous, though small; and the hepatic and common biliary ducts are quite healthy.

Specimen was removed from the body of an old man, who died with simple hypertrophy of the heart and exophthalmic bronchocele, and who was not known to have ever suffered with biliary trouble. (Dr. W. Pepper.)

## Pancreas.

1425. *Pancreas*, showing saccular dilatation of its ducts.—The pancreatic duct has been obstructed, about one inch from its entrance into the intestine, by cirrhotic inflammation of the surrounding tissue of the pancreas. The duct behind this point is distended into large pouches with thin fibrous partitions; the secreting structure of the gland is destroyed, and in one place, at least, perforation of one of the pouches has occurred.

The common biliary duct had also formerly been compressed, and the patient was deeply jaundiced until death. (Dr. Da Costa.)

## Spleen.

1429. *Spleen*, showing abscess.—The spleen is rather large, and at the lower end, immediately beneath the capsule, there was about f℥ss. of ichorous matter in a cavity, with somewhat firm, yellowish walls, about two lines thick. This fluid contained shrivelled granular cells, altered blood-corpuscles, granular matter, and pigment. The blood was dark and fluid. No other lesions existed.

Case of P——, a German, æt. 45, who, for six weeks previous to his death, presented the following symptoms: Painful swelling of the right knee; very frequently repeated, irregular chills, followed by profuse sweats and not controlled by quinia; and, finally, coma, and petechiæ and vibices over the surface. No injury at all is known to have been received. (Dr. George Pepper. Prac. Path. Society, December 27th, 1866.)

1434. *Spleen*, showing cancerous nodule attached near its hilus.—The spleen is small, its tissue apparently healthy. The capsule over its external surface is healthy, but on the inner surface there is a cancerous nodule, about one inch in diameter, springing from its capsule near the hilus. The surface of this nodule presents numerous filamentous adhesions, and the rest of the capsule over the inner face is thickened and rough, from torn adhesions. (Case which furnished Specimens Nos. 1454, 1455, 1496.)

## Peritoneum.

1454. *Cancerous Nodules in the Omentum.*—A section of the stomach is seen showing a healthy appearance, but from its greater curvature hang several oval cancerous masses, the largest fully three inches long. These are united to each other, and to the stomach and adjacent viscera, by strong bands of organized lymph.

Case of Mrs. B——, æt. 62, who died of extensive cancerous disease, affecting the serous membranes and the left

ovary. (Dr. S. W. Mitchell. Proc. Path. Soc., March 27th, 1867.)

1455. *Cancerous Nodules on the Peritoneum.*—The portion of peritoneum is thickened and opaque, and presents, on its free surface, numerous cancerous nodules, not exceeding one-third of an inch in diameter, either isolated or matted together. (From same case as above.)

### Respiratory System.

1468. *Larynx*, showing an oblique comminuted fracture, involving the thyroid and cricoid cartilages, and extending through the base of the right arytenoid, dislocating and driving it through the mucous membrane. There was œdema of the glottis, and œdema and ecchymosis of the arytenoepiglottidean folds.

Case of P. M., æt. forty-five, admitted to the Pennsylvania Hospital, January 16th, 1866, having been struck over the larynx by a piece of wood. There was emphysema of the neck, bloody sputa, and rapidly increasing dyspnœa. Tracheotomy was performed, but he died in eighteen hours, and at autopsy, marked emphysema of the anterior mediastinum and deep congestion of the lungs were found. (Dr. W. Hunt, Amer. Jour. Med. Sciences, vol. 57, p. 378, April, 1866.)

1483. *Lung and Bronchial Glands*, showing tuberculous disease.—The upper lobes of the right lung are infiltrated with gray tubercle, and a cavity two inches in diameter, with irregular ragged walls of yellow cheesy tubercle, exists at the anterior border of the upper lobe, extending upwards from its junction with the middle lobe. The bronchial glands are enlarged, forming a mass about the size of a hen's egg, and most of them contain tuberculous deposit. The left lung presented a slight degree of disease, and there was also tubercular peritonitis in the upper part of abdomen, with a few tubercles in the spleen.

Case of Fanny, æt. 3, admitted to Children's Home, September 1st, 1866; she had suffered with measles, followed by

diarrhœa, cough, emaciation, and physical signs of a cavity near the right apex; death occurred December 1, 1866. (Dr. W. Pepper, Proc. Path. Soc., December 26th, 1866.)

1496. *Cancer of Pleura.*—The specimen shows an almost hemispherical nodule of encephaloid cancer, about three fourths of an inch in diameter, lying in the posterior part of the fissure, between the upper and middle lobes of the right lung, and attached to the pleura by strong adhesions. The lobes of the lung are adherent to each other, and there are two similar, though smaller, nodules on the pleura at the bottom of the fissure.

Case of cancer of the serous membranes, which furnished Specimens No. 1434, 1454, 1455. (Dr. S. W. Mitchell, Proc. Path. Soc., March 27th, 1867.)

1520. *Aortic Disease*, followed by embolism of cerebral artery.—The aortic valves are insufficient, and their ventricular surface is covered with vegetations, some of which are filamentous and attached by their pedicles; one leaflet has been ulcerated through from its free edge nearly to its base of attachment.

Case of Mary Foley, æt. 21, admitted to the Pennsylvania Hospital, April 26th, 1866, with cardiac disease. Soon after admission, complete left-sided hemiplegia appeared suddenly, and she died September 13th. There was a clot in the right middle cerebral artery, with white softening of right middle and anterior cerebral lobes. (See Specimen No. 1231.)

1534. *Ante-mortem Heart Clots*, very firm and quite white, save in the centre, where at the time of removal they were of light-reddish color. The largest portion occupied the right auricle, extending upwards into the vena cava and its radicles; it also extended into the right ventricle, and was prolonged into both pulmonary arteries almost to their finest ramifications. There is a distinct impression of the leaflets of the pulmonary valves remaining on the clot, showing where it was moulded upon these structures.

Case of a male adult, who was admitted to the Pennsylvania Hospital with delirium tremens, in a very prostrate condition, and died in a few hours with symptoms of extreme circulatory embarrassment.

1561. *Aneurism of Innominate Artery.*—The heart shows slight mitral disease. The ascending part of the arch of the aorta is dilated and atheromatous, and the aneurism involves part of the upper wall of the aorta and the entire innominate artery, forming a tumor more than four inches in diameter. This cavity is to a great extent filled with clots, resulting from ligation of the carotid. The left pneumogastric nerve is seen losing itself on the front surface of the aneurism, and the right nerve was also much compressed. The recurrent laryngeal nerves, especially the right one, are also seen to be strongly pressed upon.

Case of John Granfield, æt. 51, who had presented symptoms of aneurism of the innominate for some time; the specimen was obtained after ligation of the right common carotid, followed by death on the seventh day. (Dr. Hewson, Pennsylvania Hospital Reports, vol. i.)

1563. *Right Common Carotid*, after ligation, showing the artery occupied by firm, partly decolorized clot, down to within a few lines of the bifurcation of the innominate.

Case of Henry Cater, æt. 45, admitted September 12th, 1864. The ligation was performed to arrest severe secondary hemorrhage, occurring on the thirteenth day after an operation for the removal of a tumor involving the thyroid gland. The patient had an attack of erysipelas following this operation, and though, after the ligation, he appeared to improve for several days, symptoms of pyæmia developed themselves, and he died on the tenth day. The ligature was ready to separate, having ulcerated through the coats of the vessel. (Dr. Morton.)

### Genito-Urinary System.

1614. *Chronic Perinephritis*, with dilatation of the calyces

of the kidney.—The capsule of the kidney is very dense, tightly adherent, and in places forms, with the condensed fat and connective tissue, a firm layer one-third of an inch thick. The vessels at hilus and the pelvis are imbedded in dense fibrous tissue. The calyces of the kidney are very much dilated, causing great thinning out of the cortical structure, especially near the upper end.

Case of a man who died in the Episcopal Hospital, having long suffered with chronic cystitis.

1722. *Vesico-vaginal Fistula.*—Case of M. S——, æt. 38, admitted to Pennsylvania Hospital, February 13th, 1866. The accident had happened with her fifth child, the delivery being instrumental. The fistula was longitudinal, two and a half inches in length. This was closed by Dr. Agnew, fourteen silver stitches being inserted, and secured by shot clamps; and the patient did well for five days, all the urine passing by catheter, when she sank into a typhoid pyæmic state, and died on the tenth day. The adhesions between the margins of the fistula had given away, and the edges were coated with grayish, discolored lymph. There was no inflammation of bladder or uterus. (Dr. D. Hayes Agnew, Memoir on Vesico-vaginal Fistula, Philadelphia, 1867.)

1689. *Large Unilocular Ovarian Cyst*, stuffed and dried.—The tumor is developed from the left ovary, the under portion of which is converted into a unilocular cyst measuring thirty-five inches in the circumference of its long diameter, and thirty in that of its short or transverse diameter, with moderately thick fibrous walls lined by epithelium, and which contained several gallons of ropy, viscid, variously colored fluid. The remainder of the ovary was seen on the upper surface of the cyst, and presented incipient cystic disease. There were strong adhesions between the cyst and abdominal wall and intestines, and a broad band of organized lymph is preserved passing from the anterior part of the tumor to the fundus of the urinary bladder,

dragging upon this viscus. The uterus, right ovary, and other viscera were quite healthy.

Case of Alice Marland, æt. 31, admitted to Pennsylvania Hospital, December 13th, 1866. The patient was married, but had never borne children. The tumor appeared several years previously, and had been already tapped eight times; there have been numerous attacks of subacute peritonitis. On admission she was much exhausted, and colliquative diarrhœa set in, though the size of the tumor rapidly increased, and she died January 10th, 1867.

1691. *Section of Multilocular Ovarian Cyst.*—The external surface of the tumor is rough and shaggy from numerous adhesions, and is also tightly adherent to the posterior surface of the uterus, which seems quite healthy. The inner surface of the section presents nine or ten pouches, varying in size from one and a half to three inches in diameter, the partitions being formed of dense fibrous tissue. The contents of these pouches are quite varied. In several of them are seen papillary glandular growths, which are attached to the cyst-wall by delicate pedicles or more broad bases, and terminate in one or more little bulbous heads, or in some cases from small masses like cocks-combs or portions of cauliflower. The masses which have broad bases are more compact and flat, only partially filling the secondary cysts in which they have grown, while the more delicate, pediculated growths completely fill two of the pouches. The two forms are, however, conjoined in the same cyst in several instances. One of the pouches is filled with a ball of whitish sebaceous matter, imbedded in which are numerous thin, light-colored hairs. And finally there is an oblong piece of bone, much resembling a tooth in form, inserted into the partition wall of the cyst above this one. History unknown. (See Plate No. 1.)

1692. *Section of the same Multilocular Ovarian Cyst*, from which the above specimen was obtained.—The external surface is quite smooth. The true wall of the parent cyst at

FIG. 25.

Specimen 1691.

PLATE I.

FIG. 26.

Specimen 1693.

PLATE II.

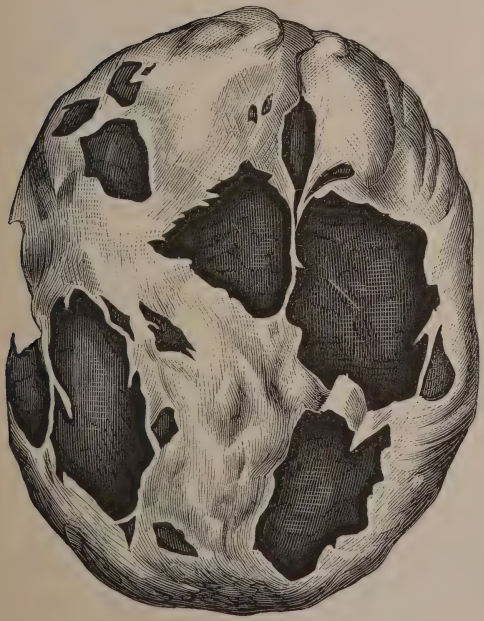
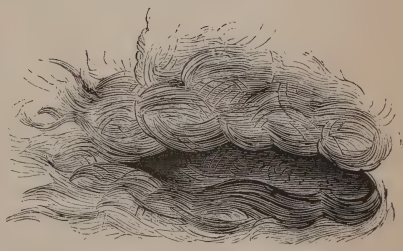


FIG. 27.

Specimen 1693.

PLATE II.



this part is not more than a line in thickness, but from its inner surface it sends off partitions, forming innumerable secondary cysts, varying in size from a merely visible opening to one and a half inches in diameter. The walls of these secondary cysts are exceedingly delicate, and in many instances have collapsed and hang as wavy filaments. Their contents were mainly a viscid, ropy fluid, and in no instance is any solid growth found in their cavities. History unknown.

1693. *Piliferous Ovarian Cyst*, communicating with the intestinal canal.—Case of Bessie Coulton, æt. 52, Irish, by occupation a seamstress, admitted to the Pennsylvania Hospital, March 11th, 1867, and died April 27th, 1867. No satisfactory history could be obtained of the development of the disease, which was a large tumor in the right side of the abdomen. For some days after admission she presented symptoms of intestinal obstruction; but, for several weeks preceding death, an uncontrollable, exhausting diarrhœa existed, and much hastened the fatal event. The tumor was rounded, quite firm, and seemed very closely attached to the abdominal walls.

On opening the abdominal cavity marked evidences of old peritonitis were seen. The various folds of the small intestine were closely agglutinated to each other, and there was an appearance of a large round fluctuating tumor, eight inches in diameter, filling the right iliac region, extending upwards towards the hypochondria, and across beyond the median line. On examining this more carefully it was found to be formed entirely by the agglutination of various parts of the viscera. Large portions of its walls, especially the upper and anterior parts, were formed by folds of small intestine; its posterior wall consisted of the mesentery, while inferiorly was the uterus, with the recto-uterine and vesico-uterine folds. The portions of surface of these parts which entered into the formation of this cavity presented marked brown and blackish discoloration, as though from chronic inflammation and contact with putrid fluids. The small intestines especially presented this condition, and in several

points there was deep ulceration of the inner coats of the bowel, so that only the discolored and softened peritoneum prevented the escape of their contents. In tracing the small intestine downwards there were found quite numerous small round ulcerations with excavated centres, many of which occupied parts of Peyer's patches; and upon reaching a point, probably six or eight inches above the original seat of the ileo-cæcal valve, the ileum came to an abrupt end. About one-half of its wall continued onwards for a short distance, forming part of the wall of the cavity above described, but the rest of it terminated in a rounded discolored lip. There were no traces whatever to be found of the cæcum, appendix cæci, or the beginning of the ascending colon. The ill-effects of the sloughing of this part of the intestine were partly counteracted by adhesions which had formed between the lower end of the ileum and the upper end of the colon, so that much of the fecal matter passed directly onwards through the bowel, though a portion escaped into the cavity of the peritoneum, circumscribed as above mentioned, which thus contained a large amount of yellowish fluid, of a strong fecal odor.

It also contained, however, a true cyst, lying free in its cavity, of nearly equal size to itself, with thin walls, which were shaggy, presented numerous irregular openings, and were in an advanced state of gangrenous decomposition. The fluid fecal matter had of course found entrance into this gangrenous cyst, but on removing it, and emptying the fluid from it, it was found to contain also a large mass of brown hair, matted together with sebaceous matter. After treatment with caustic potassa, the saponified fat was entirely removed by thorough washing, and the hair obtained clean. It forms a mass fully three and a half inches long and one and a half inches in thickness, the outer surface loose and curly, the hairs being long and interwoven, and in one part a distinct and close twist has been produced during the growth of the hair. (See Plate No. 2.)

Upon making a section of the ball, the inner hairs are seen to be densely felted together, and of a more reddish-brown

shade. The hairs forming this mass had no longer any connection with the walls of the cyst. Microscopically examined they proved to be human hairs, with perfectly developed shafts; their formerly attached ends, however, terminated in oval bulbous enlargements, but did not present the appearance of perfect hair-bulbs.

The inner surface of the cyst still presented in places a thin layer of unctuous sebaceous matter, with quite numerous short and light-colored hairs springing from it. It was impossible to discover the original point of attachment of this cyst, though it had undoubtedly been developed from the right ovary. The uterus was healthy, the right Fallopian tube was readily found, and there was a hard puckered nodule in the broad ligament, and involved in the wall of the cavity, which was in all probability the atrophied right ovary. The left ovary presented a single barren serous cyst, about the size of a hen's egg.

There were two or three firm, whitish nodules, about half an inch in diameter, attached to the outer surface of the small intestine, which presented the microscopic appearances of epitheliomata, having no true fibrous stroma, and showing numerous large nucleated cells and concentrically disposed cells. (See Specimen 1350.)

There were no similar deposits found elsewhere, the other organs presenting no marked departure from the healthy condition.

It will be observed that the discharge of the sloughing parts of intestine passed entirely unnoticed, although it is probable that it occurred soon after the symptoms of obstruction yielded. It was suggested, after the autopsy, that these symptoms were caused by the patient having swallowed the hair at different times, until it had so accumulated as to cause obstruction, and lead to ulceration and sloughing of the bowel. Apart, however, from the entire absence of any history of such a habit on her part, this idea is entirely refuted by the position of the hair-ball inside the cyst, the close felting and twisting of the hairs, the peculiar sebaceous matter in which they were imbedded, and still more by the hairs

which were found still attached to the cyst-wall. Deficient as the record is in careful ante-mortem examinations, the only explanation of the specimen appears to be that it is a single piliferous cyst of the right ovary, which, having been detached from its connection, had become gangrenous, involved the adjacent portions of intestine in destructive inflammation, and had itself been surrounded by a pseudo-cystic cavity formed by adherent viscera, into which the ileum freely poured its fecal contents. (Dr. W. Pepper.)

# ABSTRACT OF THE CASES

## OF PATIENTS TREATED IN THE PENNSYLVANIA HOSPITAL, IN THE YEAR ENDING APRIL 27, 1867.

| SURGICAL CASES. | Cured. | Relieved. | By friends or request. | Misconduct. | Eloped. | Died. | Remain. | Total. |
|---|---|---|---|---|---|---|---|---|
| Fractures, simple, Cranium and Face, | 5 | 2 | 3 | — | — | 6 | 2 | 18 |
| " " Trunk and Pelvis, | 14 | 1 | — | — | — | 9 | 4 | 28 |
| " " Superior Extremities, | 114 | 7 | 7 | 2 | 2 | — | 6 | 138 |
| " " Inferior " | 88 | 4 | 5 | — | — | 4 | 12 | 113 |
| " compound, Cranium and Face, | 6 | 2 | — | — | — | 7 | 1 | 16 |
| " " Trunk and Pelvis, | — | — | — | — | — | 1 | — | 1 |
| " " Superior Extremities, | 46 | 10 | 1 | — | — | 9 | — | 66 |
| " " Inferior " | 18 | 1 | 3 | — | — | 21 | 14 | 57 |
| " ununited and partial, | 1 | 3 | — | — | — | — | — | 4 |
| Luxations, | 22 | 1 | — | — | — | — | — | 23 |
| Wounds—Incised, | 35 | 4 | — | — | — | 2 | — | 41 |
| " Punctured, | 2 | 1 | — | — | — | — | 1 | 4 |
| " Lacerated, | 51 | 14 | 3 | — | — | 5 | 3 | 76 |
| " Contused, | 21 | 4 | — | — | 1 | 1 | 4 | 31 |
| " Gunshot, | 17 | 3 | 2 | — | — | 5 | 2 | 29 |
| " Penetrating, | 4 | — | — | — | — | 2 | 1 | 7 |
| Contusions and Sprains, | 108 | 13 | 4 | — | — | 4 | 5 | 134 |
| Concussions of Brain and Spinal Cord, | 8 | 1 | — | — | — | — | — | 9 |
| Burns and Scalds, | 25 | 5 | 6 | — | — | 11 | 8 | 55 |
| Frostbite, | 5 | 1 | — | — | — | — | 1 | 7 |
| Abscess, | 24 | 3 | 2 | — | — | 2 | 3 | 34 |
| Paronchyia, | 10 | — | — | — | — | — | 1 | 11 |
| Tumors and Polypi, | 6 | 2 | 2 | — | — | — | 2 | 12 |
| Ulcers, | 26 | 7 | — | — | 1 | — | 1 | 35 |
| Diseases of Bones and Joints, | 25 | 20 | 8 | 1 | — | 4 | 13 | 71 |
| " Eye and Ear, | 11 | 5 | 3 | — | — | — | 7 | 26 |
| Fistulæ, | 13 | 5 | 2 | — | — | 1 | 2 | 33 |
| Hemorrhoids, | 3 | — | — | — | — | — | — | 3 |
| Carbuncles, | 3 | — | — | — | — | — | — | 3 |
| Cancers, | 5 | — | 4 | — | — | 1 | 1 | 11 |
| Aneurism and Varix, | 3 | 1 | — | — | — | 1 | — | 5 |
| Syphilis, Gonorrhœa, and Gleet, | 64 | 15 | 6 | — | 1 | — | 13 | 99 |
| Strictures, | 3 | 1 | 1 | — | — | — | 2 | 7 |
| Hernia, | 4 | — | — | — | — | — | — | 4 |
| Urinary Calculi and Foreign Bodies in the Bladder, | 1 | — | — | — | — | — | 2 | 3 |
| Diseases of Genito-Urinary Organs, | 13 | 2 | 2 | 1 | — | — | 2 | 20 |
| Orchitis, | 4 | 2 | — | — | — | — | — | 6 |
| Gangrene, | 1 | — | — | — | — | — | — | 1 |
| Angioleucitis, | 1 | — | — | — | — | — | — | 1 |
| Pyæmia, | — | — | — | — | — | 2 | — | 2 |
| Erysipelas, | — | — | — | — | — | — | 1 | 1 |
| Tetanus, | — | — | — | — | — | 1 | — | 1 |
| Neuroma, | — | 1 | — | — | — | — | — | 1 |
| Traumatic Emphysema, | 1 | — | — | — | — | — | — | 1 |
| Deformity, | 1 | 1 | 1 | — | — | — | — | 3 |
| | 812 | 142 | 65 | 4 | 5 | 99 | 114 | 1241 |

| MEDICAL CASES. | Cured. | Relieved. | By friends or request. | Misconduct. | Eloped. | Died. | Remain. | Total. |
|---|---|---|---|---|---|---|---|---|
| Bronchitis, | 14 | 5 | 2 | — | 2 | 1 | — | 24 |
| Hæmoptysis, | — | 1 | — | — | — | — | — | 1 |
| Phthisis Pulmonalis, | — | 14 | 11 | — | — | 15 | 5 | 45 |
| Pleurisy, | 14 | — | 2 | — | — | — | 2 | 18 |
| Pleuro-pneumonia, | 3 | — | — | — | — | — | 1 | 4 |
| Pneumonia, | 9 | — | — | — | — | 3 | 1 | 13 |
| Asthma, | — | — | 1 | — | 1 | — | 2 | 4 |
| Diseases of the Heart, | — | 5 | 1 | — | — | 10 | 3 | 19 |
| Laryngitis, Pharyngitis, and Tonsillitis, | 5 | 2 | 1 | — | — | — | 2 | 10 |
| Diseases of Stomach and Bowels, | 2 | 2 | — | — | — | 2 | — | 6 |
| " Liver and Spleen, | 4 | 2 | 3 | 1 | — | 5 | 2 | 17 |
| " Kidneys and Bladder, | 4 | 4 | 1 | — | — | 2 | 2 | 13 |
| Diarrhœa, | 16 | 3 | 2 | — | — | 2 | 1 | 24 |
| Dysentery, | 3 | 2 | — | — | — | 1 | — | 6 |
| Dyspepsia, | 8 | — | 1 | — | — | — | — | 9 |
| Dropsy, | 2 | 3 | — | — | — | — | 2 | 7 |
| Erysipelas, | 4 | — | — | — | — | — | 1 | 5 |
| Diseases of Brain and Spinal Cord, | — | 2 | — | — | — | 2 | — | 4 |
| Delirium Tremens and Alcoholism, | 56 | 3 | 3 | — | — | 9 | — | 71 |
| Paralysis, | 1 | 6 | 2 | — | — | — | 1 | 10 |
| Epilepsy, | — | 1 | 1 | — | — | — | — | 2 |
| Chorea, | 2 | — | — | — | — | — | — | 2 |
| Neuralgia, | 5 | 1 | 3 | — | — | — | 2 | 11 |
| Hysteria, | 3 | 1 | — | 1 | — | — | — | 5 |
| Diphtheria, | 1 | — | — | — | — | — | — | 1 |
| Fevers—Intermittent, | 42 | — | 1 | — | 1 | — | 1 | 45 |
| " Typhoid, | 18 | — | 1 | — | — | 4 | 1 | 24 |
| " Typhus, | 9 | — | 1 | — | — | 3 | 3 | 16 |
| " Remittent, | 7 | 1 | — | — | — | 1 | — | 9 |
| " Malarial, | 31 | — | — | — | — | — | 4 | 35 |
| Poisoning, | 2 | — | — | — | — | — | — | 2 |
| Rheumatism, | 63 | 8 | 2 | — | 1 | — | 11 | 85 |
| Oxaluria, | — | — | — | — | — | — | 1 | 1 |
| Variola and Varioloid, | 2 | — | — | — | — | — | 1 | 3 |
| Scarlatina, | 3 | — | — | — | — | — | — | 3 |
| Anæmia and Debility, | 13 | 7 | 1 | 1 | — | — | 3 | 25 |
| Diseases of Skin, | 12 | 6 | 3 | — | 1 | — | 2 | 24 |
| " Uterus and Appendages, | 5 | 3 | 1 | — | 1 | 1 | 1 | 12 |
| Sunstroke, | 16 | — | — | — | 1 | 10 | — | 27 |
| Aphonia, | 2 | — | — | — | — | — | — | 2 |
| Tuberculosis, | — | — | 1 | — | — | 3 | — | 4 |
| Asphyxia, | — | — | — | — | — | 1 | — | 1 |
| Dementia, | — | 1 | 2 | — | — | — | — | 3 |
| Influenza, | 3 | — | — | — | — | — | — | 3 |
| Scurvy, | 3 | 2 | — | — | — | — | 2 | 7 |
| Spermatorrhœa, | — | 1 | 1 | — | — | — | — | 2 |
| Lead Colic and Palsy, | — | 3 | — | — | — | — | — | 3 |
| Phlegmasia, | 2 | — | — | — | — | 1 | — | 3 |
| Catarrh, | 1 | — | — | — | — | — | — | 1 |
| Rheumatic Arthritis, | — | 1 | — | — | — | — | — | 1 |
| Muscular Atrophy, | 1 | 1 | 1 | — | — | — | — | 3 |
| Hypochondriasis, | 2 | — | — | — | — | — | — | 2 |
| Chlorosis, | — | 2 | — | — | — | — | — | 2 |
| Emphysema of Lungs, | — | 2 | — | — | — | — | — | 2 |
| Purulent Infection, | 1 | — | — | — | — | — | — | 1 |
| Duchenne's Disease, | — | 1 | — | — | — | — | — | 1 |
| Cancrum Oris, | 1 | — | — | — | — | 1 | — | 2 |
| Grave's Disease, | — | — | 1 | — | — | — | — | 1 |
| Cholera, | 4 | — | — | — | — | 4 | — | 8 |
| Scrofula, | 1 | 1 | — | — | — | — | — | 2 |
| Empyema, | — | 1 | — | — | — | — | — | 1 |
| Pregnant Women—Safely Delivered, | 3 | — | — | — | — | — | — | 3 |
| Infants born in the House—Discharged in Health, | 3 | — | — | — | — | — | — | 3 |
| | 406 | 98 | 50 | 3 | 8 | 81 | 57 | 703 |
| SURGICAL CASES, | 812 | 142 | 65 | 4 | 5 | 99 | 114 | 1241 |
| TOTAL, | 1218 | 240 | 115 | 7 | 13 | 180 | 171 | 1944 |

# STATISTICS

OF THE

# PENNSYLVANIA HOSPITAL

## FOR THE YEAR 1866–67.

| | Pay. | Free. | Total. |
|---|---|---|---|
| Number of Patients remaining in the Hospital April 28th, 1866, | 37 | 134 | 171 |
| Admitted during the year, | 435 | 1338 | 1773 |
| Treated during the year, | 472 | 1472 | 1944 |
| Discharged " " | 423 | 1350 | 1773 |
| Remaining April 27th, 1867, | 49 | 122 | 171 |

Average number of patients maintained, 170.126.
Average time each patient remained in the House, 31.428 days.

Of the patients discharged

| | |
|---|---|
| The proportion cured was | 68.697 per cent. |
| " " relieved, | 13.537 " |
| " " removed without material improvement, | 6.486 " |
| " " discharged for misconduct or eloped, | 1.128 " |
| " " died, | 10.152 " |
| | 100. |

Of the 1773 patients admitted during the year, there were

| | Males. | Females. | Total. |
|---|---|---|---|
| Under 18 years of age, | 192 | 51 | 243 |
| Single, | 693 | 170 | 863 |
| Married, | 422 | 77 | 499 |
| Widowed, | 80 | 88 | 168 |
| | 1387 | 386 | 1773 |

NATIVITY OF PATIENTS.

| | | | |
|---|---|---|---|
| Born in the United States, | 707 | Born in Switzerland, | 3 |
| " England, | 92 | " Denmark, | 7 |
| " Ireland, | 771 | " Austria, | 1 |
| " Scotland, | 25 | " New Zealand, | 1 |
| " Wales, | 8 | " Azores, | 3 |
| " Russia and Germany, | 91 | " Shetland, | 1 |
| " Holland, | 1 | " Isle of Man, | 1 |
| " Sweden and Norway, | 16 | " St. Helena, | 1 |
| " British America and West Indies, | 21 | " Russia, | 1 |
| | | Nativity unknown, | 1 |
| " Spain and Portugal, | 2 | | |
| " Italy, | 5 | | 1773 |
| " France, | 14 | | |

| | |
|---|---|
| Cases of accidental injury remaining in the Hospital April 28th, 1866, | 71 |
| " " " admitted during the year, | 702 |
| " " " treated " " | 773 |

Since the establishment of the Hospital in 1752, there have been admitted into it 79,181 patients, of whom 49,332 have been poor persons, supported at the expense of the Institution. Of these 79,181 patients there have been

| | |
|---|---|
| Cured, | 51,167 |
| Relieved, | 10,045 |
| Discharged without material improvement, | 5,976 |
| Discharged for misconduct and eloped, | 1,680 |
| Pregnant women safely delivered, | 1,334 |
| Infants born and discharged in health, | 1,254 |
| Died, | 7,554 |
| | 79,010 |
| Remaining April 27th, 1867, | 171 |
| | 79,181 |

*Table exhibiting the number of natives of the United States and of foreign countries received into the Hospital during the last ten years.*

| | United States. | Ireland. | Other countries. |
|---|---|---|---|
| 1858, | 655 | 694 | 307 |
| 1859, | 654 | 676 | 328 |
| 1860, | 707 | 763 | 326 |
| 1861, | 814 | 682 | 346 |
| 1862, | 817 | 596 | 265 |
| 1863, | 756 | 610 | 224 |
| 1864, | 711 | 768 | 261 |
| 1865, | 760 | 804 | 274 |
| 1866, | 817 | 849 | 334 |
| 1867, | 707 | 771 | 295 |
| | 7398 | 7213 | 2960 |

The whole number of the patients of the Institution, including those admitted into the Pennsylvania Hospital for the Insane, is 84,372.

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